

**The Privatization and Liberalization of the Mexican Telecommunications Sector: New Technology and Policy Alternatives**

by

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Submitted to the Department of Electrical Engineering and Computer Science and the Technology and Policy Program on August 9, 1996 in Partial Fulfillment of the Requirements for the Degree of Master of Science in Technology and Policy

## **ABSTRACT**

The telecommunications sector in México has experienced a dramatic change during the last few years. In late 1980s this sector was controlled by the government and dominated by the state-owned monopoly, Telmex. Now, after Telmex's successful privatization and subsequent profound market liberalization, it is considered among the most open in the world.

A new regulatory structure and government attitude toward telecommunications is enabling an accelerated development of this sector. This thesis argues that there is still much to be done in this area, but the basis for sustainable growth of the Mexican telecommunications infrastructure is in place.

This thesis reviews the current status of the network, analyzes competitors in the new market structure, and discusses new regulations and the effects derived from Telmex's privatization. Finally, a framework for a policy analysis of this sector is discussed, and some recommendations are presented.

Thesis Supervisor: Lee W. McKnight  
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Héctor J. Gallegos Mtz.  
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## 1. INTRODUCTION

Telecommunications is a central feature in the emerging national and international economy. The production of information is becoming increasingly important in the economy, and telecommunications is the key infrastructure for transporting information. The need for telecommunications services in the contemporary economy derives directly from the economy's dependence on information and, more specifically, on the need to communicate information. The technology itself may spatially reconfigure our cities and regions in addition to affecting the competitiveness of their economies.<sup>1</sup>

As little as a decade ago it was widely believed that telecommunication was a natural monopoly, and that the only way to promote universal access at affordable prices was with a single operator. Many advanced countries were proponents of state-owned telecommunication monopolies, and that model was generally imported without question into the developing world. Today, with many countries having liberalized and others in the process of liberalizing their telecommunication markets, an increasing number of developing countries are recognizing the benefits of harnessing competition as a tool for economic progress.

In 1994 México became the 25th member of the OECD. It has the least developed telecommunication infrastructure among this group of countries. In 1993, with only 8.8 lines per 100 inhabitants, its telephone penetration rate was roughly one-fifth the OECD average (see Table 1-1). Furthermore, the diffusion of telecommunication services throughout the

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<sup>1</sup> Wilson 1993, p 28

country is extremely uneven, with the available infrastructure concentrated in large urban areas, whereas many rural communities are without any service.<sup>2</sup>

**Table 1-1 Growth in OECD Mainlines, 1992-93**

	Mainlines <sup>1</sup> per 100 Inhabitants	
	1992	1993
Australia	47.1	48.7
Austria	43.9	45.1
Belgium	42.5	43.7
Canada	57.1	59.2
Denmark	58.1	58.9
Finland	54.4	54.4
France	52.5	53.6
Germany	43.9	45.7
Greece	43.6	45.7
Iceland	53.9	54.4
Ireland	31.4	32.8
Italy	41.0	41.8
Japan	46.4	46.8
Luxembourg	52.8	54.1
México	8.0	8.8
Netherlands	48.7	49.9
New Zealand	44.4	46.0
Norway	52.9	54.2
Portugal	30.6	31.1
Spain	35.3	36.4
Sweden	68.2	68.0
Switzerland	60.3	61.1
Turkey	16.1	18.4
United Kingdom	45.2	49.4
United States	56.5	57.4
OECD	43.4	44.8

Source: OECD, ITU.

1. Connects the subscriber's terminal equipment to the public switched network and has a dedicated port in the telephone exchange equipment.

<sup>2</sup> The OECD Observer, June/July 1995, p 26

In view of the increasing importance of the transfer of information to economic and social development, the rapid building-up of the telecommunication infrastructure poses a considerable challenge for México. This is one reason why the country has acted to reform its telecommunication market: separating operations from regulation, privatizing the telecommunication operator and liberalizing its market. México now has the opportunity to be a pace-setter in using competition to bridge the gap with other countries -- a development made even more desirable by the financial instability which erupted early in 1995.<sup>3</sup>

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<sup>3</sup> The OECD Observer, June/July 1995, p 26



## 2. MÉXICO

### 2.1 *SOCIO-POLITICAL BACKGROUND*

México's political system has long defied easy classification. In the 1950s and '60s some U.S. political scientists depicted the regime as a "one-party democracy" that was evolving toward "true" democracy. México now seems to belong to that rapidly expanding category of hybrid, part-free, part-authoritarian systems that do not conform to classical typologies. They are characterized by competitive (though not necessarily fair and honest) elections that install governments more committed to maintaining political stability and labor discipline than to expanding democratic freedoms, protecting human rights, or mediating class conflicts.<sup>1</sup>

For most of the period since 1940, México has had a pragmatic and moderate authoritarian regime, not the zealously repressive kind that emerged in Latin America's southern cone in the 1960s and '70s. It has been an institutional system which has dealt successfully with one of the most difficult problems for nondemocratic systems: elite renewal and executive succession. The Mexican system has been inclusionary, given to co-optation and incorporation rather than exclusion or elimination of troublesome political forces. It strives to incorporate the broadest possible range of social, economic, and political interests within the official party, its affiliated "mass" organizations, and opposition groups whose activities are sanctioned by the regime.

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<sup>1</sup> Cornelius and Craig 1991, p 23

The Mexican state represents a coalition of interests, some within the regime itself, some outside. The state has retained a significant degree of autonomy from elite interests in the civil society. It is not the captive of any particular social segment, even though some groups (e.g., the urban middle classes, organized labor, entrepreneurs) clearly have greater influence and more representatives within the ruling political elite than others. México has a strong state, but not so strong that it can rule in open defiance of the rest of society.

On paper, the Mexican government appears to be structured much like the U.S. government: a presidential system, three autonomous branches of government (executive, legislative, judicial) and checks and balances, and federalism with considerable autonomy at the local (municipal) level. In practice, however, México's system of government is far removed from the U.S. model. The president, operating with relatively few restraints on his authority, has traditionally dominated the legislative and judicial branches.<sup>2</sup>

Both Houses of the Federal Legislature have been dominated continuously by representatives affiliated with the ruling PRI. Opposition party members, who now comprise a significant portion of the lower House of Congress, can criticize the government and its policies vociferously; but their objections to proposals initiated by the president and backed by his party rarely affect the final shape of legislation. Courts and legislatures at the state level normally mirror the preferences of the state governors, who themselves are hand-picked by the incumbent president.

At all levels of the system, the overwhelming majority of those who are elected to public office are, in effect, appointed to their positions by higher-ups within the PRI-

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<sup>2</sup> Cornelius and Craig 1991, p 24

government apparatus. Until recently, selection as the candidate of the official party has been tantamount to election, except in some municipalities and a handful of congressional districts where opposition parties are so strong that they cannot be ignored.<sup>3</sup>

Despite the federalist structure of government that is enshrined in the Mexican Constitution and legal codes, with their emphasis on the *municipio libre* (the concept of the “free municipality,” able to control its own affairs), México has a highly centralized political system. Since the 1920s, the concentration of decision-making power at the federal level has been continuous. The resulting system of centralized control is generally considered to be one of the main factors underlying México’s long-term political stability.

México is a federal republic formally composed of 31 states plus a federal district that houses the nation’s capital. On paper the states have powers over a wide range of issues. But in reality they have always been dominated by the federal government.

The states have fought a difficult struggle to gain a bigger share of the country’s political power and tax revenues. The cause became more successful when opposition politicians began to win state elections starting in 1989.

Each state is divided into *municipios* -- politico-administrative units roughly equivalent in size and governmental functions to county governments in the United States. The municipio is governed by an *ayuntamiento*, or council, headed by a *presidente municipal*. Municipal officials are elected every three years.<sup>4</sup>

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<sup>3</sup> Cornelius and Craig 1991, p 25

<sup>4</sup> Cornelius and Craig 1991, p 26

Up until the middle of the 20th century, México was a rural country. Now more than 70% of the country's population lives in urban areas. One out of every five Mexicans, in fact, resides in the metropolitan area of México City. Guadalajara and Monterrey, long cities of a relatively placid existence, have now become frenzied centers of trade and industry. A series of mid-sized cities are also expanding as they attract industry that cannot find accommodation anymore in the country's largest metropolitan areas. Puebla, León and Ciudad Juárez are just some examples of cities that have registered rapid growth over the past few years.

The expansion of these cities is in part attributable to a large migration from the countryside. The failure of México's agriculture to increase productivity at a time of rapid population growth pushed peasants to the U.S. or to México's cities. The trend is likely to continue, if only because the transformation of the countryside still faces formidable political obstacles. One solution for the country lies in a plan to develop 100 small and medium-sized cities to which the administration wants to channel new industrial investment. The infrastructure of these cities would be significantly strengthened so as to make it possible for new industrial plants to settle in them.

The federal government has been emphasizing economic policies -- e.g., deregulation, privatization, stimulation of *maquiladoras* (in-bond assembly plants) and other export-oriented industries -- from which many entrepreneurs in the states have benefited and with which they are philosophically in tune. Nevertheless, the consequences of political centralism remain dramatically evident in México today. Each successive layer of government is substantially weaker, less autonomous, and more impoverished than the levels above it.

Historically the federal government has controlled about 85 percent of public revenues, the state governments less than 12 percent , and the municipios scarcely 3 percent. However, the municipios' share has risen to about 5-7 percent of total public spending in recent years. The average municipal government depends on the federal and state governments for about 80 percent of its income; only 20 percent comes from local sources.<sup>5</sup>

Centralism has contributed to extreme inequalities in distribution of public investments and access to public services in México. By the mid-1980s the central region including México City, with about one-third of the country's total population, accounted for nearly half of total federal government expenditures. Thus the average low-income family living in a México City slum is more likely to have access to a basic public services like piped water or sewerage than a family in similar circumstances in a provincial city or small rural community.

Serious efforts to decentralize have been made only since 1984. Under de la Madrid and Salinas, state and municipal authorities have been involved more fully in the planning of federal development programs affecting their jurisdictions; a limited form of revenue sharing has been implemented and the Federal Constitution amended to enhance the capacity of local governments to raise their own revenues; partially successful efforts have been made to shift decision-making authority over public education and health care from the Federal Government to the states.<sup>6</sup>

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<sup>5</sup> Cornelius and Craig 1991, p 28

<sup>6</sup> Cornelius and Craig 1991, p 29

Since that time some government departments have been relocated outside of México City. Also, the responsibility for managing and paying the nation's almost one million public-school teachers has been given to the state governments. In late 1995, moreover, a plan was announced to decentralize the distribution of government agricultural subsidies.

State governments, however, are pushing for more. They are demanding a bigger share of tax revenues and greater political independence. Time seems to be on their side. The fact that a growing number of governors come from opposition parties has broken the traditional discipline vis-à-vis the central government and the ruling party. This makes it more difficult to rule México, but it gives a more solid ground to the claim that México is indeed a federal republic.<sup>7</sup>

Mexicans increasingly blame their economic distress on failures of government performance. In previous decades, the government received much credit for stimulating and guiding the nation's economic development. The economic slowdowns, inflationary spirals, and currency devaluations of the 1970s and 1980s wiped out those positive perceptions. Loss of confidence in the government's ability to manage the economy was dramatic.<sup>8</sup>

The country's government structure, however, is undergoing major changes. The first opposition victory in a gubernatorial race took place only in 1989. After that, the opposition has continued to gain ground and has scored increasingly frequent wins. The presence of the opposition in Congress, for years limited to a few legislators, has been greatly expanded as a result of the 1988 elections. This means, among other things, that the ruling party does not

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<sup>7</sup> Cornelius and Craig 1991, p 31

<sup>8</sup> Cornelius and Craig 1991, p 99

have anymore the power to change the constitution on its own, as it often did in the past. The president no longer commands the two-thirds majority required to pass constitutional amendments. To revise the Constitution now, the president must build coalitions with one or more opposition parties.<sup>9</sup>

In addition, President Salinas adopted a low-risk, gradualist approach to political reform, to prevent open ruptures within the PRI that might threaten the completion of his government's economic restructuring program.<sup>10</sup> Such approach worked fine during the first five years of his administration. However, during 1994, a series of events -- political murders, a social upheaval, etc. -- had strong impacts on the country's economic and political climate.

The current administration followed a more aggressive approach to economic and political restructuring that placed the country in a deep economic recession surrounded by the most severe political crisis México has experienced for the last two decades.

At the time of this writing some indicators have started to show improvement at the macro level. The intended positive effects of this strategy for the population yet remain to be seen.

## ***2.2 ECONOMIC BACKGROUND***

There is little debate about the importance of the state's contribution to the economic development of México since 1940. Massive public investments in infrastructure (roads, dams, telecommunications, electrification) and generous, cheap credit provided to the private sector by Nacional Financiera and other government development banks made possible a

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<sup>9</sup> Cornelius and Craig 1991, p 31

<sup>10</sup> Cornelius and Craig 1991, p 82

high rate of capital accumulation, stimulated high levels of investment by domestic entrepreneurs and foreign corporations, and enabled México to develop a diversified production capacity second only within Latin America to that of Brazil.

From 1940 until well into the 1970s, a strong elite consensus prevailed on the state's role in the economy. The state served as "rector" of the Mexican "mixed economy," setting broad priorities and channeling investment (both public and private) into strategic sectors. From the mid-1950s to the mid-1970s, the result was the much touted "Mexican miracle" of sustained economic growth at annual rates of 6-7 percent, coupled with low inflation (5 percent per annum, in the 1955-72 period). By 1980 the gross national product had reached \$2,130 per capita, placing México toward the upper end of the World Bank's list of semi-industrialized or "middle-developed" countries.<sup>11</sup>

As proprietor of PEMEX, the state oil monopoly, the government was exclusively responsible for developing the crucial oil and natural gas sector of the economy, which by the end of the "oil boom" (1978-81) was generating more than \$15 billion a year in export revenues and fueling economic growth of more than 8 percent per year -- one of the world's highest growth rates.

It is the distributive consequences of this impressive performance in economic development and, since the 1970s, the manner in which it was financed by the government that have drawn most of the criticism.

From 1940 to 1970, México's public sector acquired an international reputation for sound, conservative monetary and fiscal policies. By 1982 this image had been shattered; the

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<sup>11</sup> Cornelius and Craig 1991, p 106

basic difficulty was that the government had attempted to spend its way out of the social and economic problems that had accumulated since 1940, without paying the political cost that sweeping redistributive policies would have entailed. Instead, it attempted to expand the entire economic pie by enlarging the state's role as banker, entrepreneur, and employer. Especially after 1970, México's public sector expanded steadily while its revenue-raising capability lagged. The result was ever-larger government deficits, financed increasingly by borrowing abroad. The public sector itself was vastly enlarged, increasing the number of state-owned enterprises from 84 in 1970 to 845 in 1976.<sup>12</sup>

The Mexican divestiture program began in 1983 as part of the macroeconomic stabilization program of that period. Following a rapid buildup during the 1970s, the Mexican state-owned sector consisted in 1982 of 1,155 enterprises, producing 12.6 percent of GDP and accounting for 38 percent of investment. In that year the overall government budget deficit was nearly 17 percent of GDP, as rising interest rates and a decline in oil prices combined to push public revenues down and expenditures up.

In 1983 the government adopted a package of policies sponsored by the International Monetary Fund aimed at stabilizing the economy. The stabilization program contained several elements designed to reduce the budget deficit. These included reductions in government expenditures, primarily through investment cuts and moderation of wage increases; tax increases; divestitures; and increases in public sector prices. Thus the divestiture program was part of this larger deficit reduction package.

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<sup>12</sup> Cornelius and Craig 1991, p 112

By 1985 the economy was showing signs of improvement, with GDP growing at about 3 percent and inflation down to about 60 percent per year. However, the economy was at this point subjected to two additional shocks. First, México City was hit by a massive earthquake in September 1985, causing damage estimated at US\$4 billion. Second, oil prices plunged in 1986 to levels less than half those in 1985. As a result, GDP fell from US\$177 billion in 1985 to US\$127 billion in 1986 and inflation took off again, with prices rising 106 percent in 1986 and a further 159 percent in 1987.

The government response to the latest crisis was to embark on a complete transformation of the Mexican economy. The divestiture program, which had previously concentrated on small, relatively insignificant enterprises, began to tackle the large ones, eventually reaching some of the behemoths of the public sector. México joined the General Agreement on Tariffs and Trade and reduced tariffs to an average of 10 percent by the late 1980s. Agreement was also reached on the external debt through the Brady Plan, under which US\$45.8 billion of México's debt was rescheduled.<sup>13</sup>

The key to a successful economic stabilization program was deep cuts in government spending coupled with unprecedented steps to boost revenues, including vigorous enforcement of the tax laws and the selling of hundreds of state-owned enterprises to private investors. Of the 1,171 state enterprises existing in 1982, only 344 had not been privatized or liquidated or were in progress of divestment by the end of 1990.<sup>14</sup>

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<sup>13</sup> Tandon 1994, p 407

<sup>14</sup> Cornelius and Craig 1991, p 113

Salinas' strategy for economic recovery involved a serious effort to stimulate economic growth and restructure the economy. A central component of this effort was the sale to private investors of many of the state-owned firms that had become a drag on both the government and the economy. The de la Madrid administration had already significantly reduced the number of state firms from 1,100 in 1982 to 412 by 1988. The Salinas administration continued this process of privatization by halving the number of state firms again -- to 221 by mid-1992. Privatization reduced the level of government subsidization of state firms from 13 percent of GDP in 1982 to a mere 3 percent by 1990.<sup>15</sup>

The response of the economy to this policy regime was dramatic: inflation was brought down below 20 percent, GDP growth is between 3 and 4 percent per year, and interest rates have fallen dramatically. Thus the divestiture program must be seen as part of a highly successful package of reform policies.

### ***2.3 TECHNOLOGY AND COMPETITIVENESS FACTORS***

One important factor for Mexican growth is not a matter of government policy but of geography and history. The country's proximity to the United States no doubt has played an important role in the recent economic history of México. In terms of economic growth, it is important that México is located next to a country that is the largest market in the world, one of the world's leading sources of investment capital and new technology.<sup>16</sup>

High technology industries -- for example, those in the communications sector -- were particularly hurt by the closed economy of the 1970s and 1980s. Government monopolies,

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<sup>15</sup> Cothran 1994, p 181

<sup>16</sup> Cothran 1994, p 62

like Telmex, or private near monopolies, such as Televisa, which controlled more than 90% of the television market, prevented competition and, in some cases, hindered productive investment.<sup>17</sup>

In view of the increasing importance of the transfer of information in economic and social development, the country acted to reform its telecommunication market: privatizing the main telecommunication operator -- Telmex -- and liberalizing its market. As part of this process of reform, a new regulatory environment was introduced, which permitted, among other things, infrastructure competition in local telecommunication services and mobile communication.

Other communications markets have also opened up to competition. The cellular telephone market was developed from the start with a scheme similar to the one existing in the U.S. -- with two companies competing in every region of the country. Moreover, President Zedillo has announced that satellite telecommunication services, until now controlled by the government, are also going to be privatized.

Direct-to-home satellite programming and other pay-per-view services are gradually transforming the television market in México. Cable and codified television have had spectacular growth rates over the past few years. But given the social conditions of most Mexicans, free air broadcasts are expected to dominate the mass television market for years to come.

México is a young country with a very long history. It is a nation beholden to its past but anxious to be modernized -- a country of enormous economic potential, that has had a

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<sup>17</sup> Harvard Business Review, Jan.-Feb. 1996

checkered economic history. These contradictions are not surprising: México has always been a country of contrasts. But the big question for México now is whether the nation will continue to stumble from crisis to crisis or whether it will finally start on a path of sustained development.

To a large extent the crises of the past have been a consequence of a growing and maturing process. México's economic and political life has been dramatically transformed over this period. The country's borders have been opened to trade, and modern democratic procedures are being introduced, albeit at a slow pace. These changes were necessary. México could not have remained closed to the world and living in a system of benign authoritarianism.

But changes of this magnitude always produce turbulence. This turbulence is what we have seen in México over the past few years -- the turbulence generated by the end of a system and the beginning of a new one.

Although both local and foreign political pundits are prone to criticize México for its failures, there is a remarkable degree of consensus about the fact that economic and political liberalization is the way to go for this country. Investors might fret at the uncertainty generated by the transition to a full-fledged democracy, but no one thinks that returning to the single-party system of the past will bring back the growth of the 1960s.<sup>18</sup>

There is now more awareness than ever about the problems that remain in México's economy and political life. And although awareness is not a guarantee of success, it is clear that many of the measures that have to be made in order to ensure a sustainable economic

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<sup>18</sup> Harvard Business Review, Jan.-Feb. 1996

growth for the country have already been started. Market solutions are increasingly being applied to the country's economic problems, while democratic procedures are being implemented to solve the nation's political challenges.

The Mexican government claims that the economy will grow at a rate of 5% a year after 1997. This growth will be sustained on a solid domestic savings rate equivalent to at least 24% of the country's gross domestic product and on an open trading system of which NAFTA will be the most important part.<sup>19</sup> Election results, it says, will not be questioned anymore because electoral regulations will have been agreed upon by all political parties, and because opposition victories will continue to be common.

One may have, a considerable degree of skepticism. This is not the first time we have heard promises about major political and economic reforms in México. But perhaps the most significant force driving the country to a definitive reform is the fact that everything else has failed. After the turbulence of the past 25 years, México would appear to have no choice but to adopt the rules that have permitted the development of the world's most prosperous countries -- free markets and democracy.<sup>20</sup>

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<sup>19</sup> National Development Plan 1995-2000

<sup>20</sup> Harvard Business Review, Jan.-Feb. 1996

### **3. TELECOMMUNICATIONS IN MÉXICO**

#### **3.1 INTRODUCTION**

This chapter will discuss the status of the market structure for telecommunications in México. Describing the characteristics and roles of the main participants in each area -- local, long-distance, cellular, and satellite.

A detailed description of the services and infrastructure currently provided by Telmex, yet the main firm in this market, will be provided.

A brief history of Mexican telecommunications will serve as a background for the rest of this chapter. Additionally, I will discuss the implications of NAFTA over this sector.

The chapter will show that allowing competition into this market has been a key factor for the evolution of the Mexican telecommunications sector.

#### **3.2 HISTORY**

In March 1878, the first telephone connection was made in México between México City and the town of Tlalpan, an 11-mile distance. A telephone was subsequently installed in the home of President Porfirio Diaz. By 1880, 100 telephones were in operation in México. This compares to 30,900 phones installed in the Unites States at the same time.<sup>1</sup>

In June 1881, a private investor, A.G. Greenwood, received the first license (or “concession”) to offer telephone service in México. The next year, Greenwood transferred the license to the newly-formed Compañía Telefónica Mexicana S.A., controlled by U.S. investors. This company was renamed in 1908 as La Compañía Telefónica y Telegráfica

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<sup>1</sup> Tomlinson 1995, p 113

Mexicana, S.A. (Mexican Telephone and Telegraph). In 1905, a competing license to operate had been granted to a Swedish consortium, which included equipment-maker Ericsson. The consortium united interests under the Empresa de Teléfonos Ericsson name in 1909. These two companies, Mexican Telephone and Telegraph and Empresa de Teléfonos Ericsson, were the only two national companies in México. Other local telephone companies operated independently in several Mexican states.<sup>2</sup>

After World War I, Empresa de Teléfonos Ericsson pulled into the lead while Mexican Telephone and Telegraph declined. This all changed in 1925 when International Telephone and Telegraph (ITT), then an international phone company based in the United States, won the license to operate Mexican Telephone and Telegraph. ITT quickly expanded the company's México City operations to provide nationwide coverage. By 1932, ITT had linked the Mexican system to AT&T in the United States and to other ITT operations in Latin America.

In 1947, Teléfonos de México (Telmex) was formed under private foreign ownership to acquire Empresa de Teléfonos Ericsson. In 1950, Telmex acquired Compañía Telefónica y Telegráfica S.A., the ITT affiliate which operated the only other national telephone network. Ericsson and ITT each held a 37.5 percent interest in Telmex until August 1953, when they sold their holding to an association of Mexican investors.<sup>3</sup>

In 1972, the Mexican government acquired a majority of Telmex's capital stock. Telmex was a private company until then. At that time the company was struggling to bear

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<sup>2</sup> Tomlinson 1995, p 113

<sup>3</sup> Tomlinson 1995, p 114

the cost of integrating two different telephone companies, created originally by ITT Corp. and Ericsson, and this turned out to be too expensive, despite large loans from the government. To carry the integration to completion, the Mexican government assumed control of the company, converting its loans to stock and then buying additional stock (2 percent of the company) to assure itself of majority (51 percent) ownership. At the time of divestiture, in 1990, it owned 56 percent of the enterprise's stock.<sup>4</sup> Other local privately owned telephone companies continued to operate through 1981.

During the period of government control, Telmex's network and services grew slowly. As early as 1982, Telmex engineers had developed a plan to reconfigure México City's antiquated and insufficient phone system. Telmex's headquarters are located in México City. This enhancement of the Telmex network was delayed, however, as a result of the 1985 earthquakes. The quakes affected more than 55,000 Telmex lines and severed long-distance phone service, causing over US\$25 million in damage to Telmex's facilities. The natural disaster, though, did offer the Mexican phone company the chance to rebuild and modernize. Telmex's new system, which included 20 fiber-optic routes and a digital microwave system, had a 70-percent increase in capacity in México City over the previous network.

In 1989, Telmex decentralized its internal organization, creating five operational divisions and four administrative divisions. In the same year, México's President Salinas announced that Telmex would join the list of government entities to be privatized.<sup>5</sup> The

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<sup>4</sup> Tandon 1994, p 418

<sup>5</sup> Tomlinson 1995, p 114

guiding principles of the privatization were to ensure continued state supervision of telecommunications, to improve telephone service, to protect the rights of the company's workers and provide for worker ownership of capital stock of the company, to expand the telephone system, to foster technical and scientific innovation and to keep the company under Mexican majority control.<sup>6</sup> Mexican control of the company was required under both the terms of the license to be granted to a private organization and under Mexican law concerning foreign investment.<sup>7</sup>

### **3.2.1 NAFTA**

Substantive changes for the telecommunications sector were negotiated under NAFTA. The agreement provides cross-border access to international and domestic public networks, value-added services and intra-corporate communications. This provision ensures that firms may lease private lines, attach other equipment, such as faxes and computers, to the network, and interconnect private circuits to public networks. In addition, access would be available to perform switching, signaling and processing functions.

The agreement also eliminates Mexican duties on all telecommunications equipment, with the exception of central switching apparatus and telephone sets. In these cases, duties will be phased out over a five-year period. Restrictions were removed on foreign investment in enhanced or value-added service operations in México.

Specific to the telecommunications industry, information regarding access to and use of public networks and services are required to be made publicly available under NAFTA's

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<sup>6</sup> Tomlinson 1995, p 114

<sup>7</sup> This will be further explained in Chapter 5

telecommunications provision. With regard to Telmex, the agreement provides that if the telephone company competes in the provision of enhanced or value-added services, the company must not make use of its monopoly position to engage in anticompetitive conduct.<sup>8</sup>

### **3.3 SERVICES**

Teléfonos de México has been the principal supplier of telecommunications services in México. Until now it has had a monopoly on the provision of local and long distance services.<sup>9</sup>

In 1994, Telmex was the 18th largest national telephone system in the world based on the number of lines in service. Based on total assets as of December 31, 1993, Telmex was the third-largest company in México and the largest listed on the Mexican Stock Exchange.

In 1996, Telmex is still the only licensed supplier of fixed-link public telecommunications services in México. Telmex owns all public exchanges, the nationwide network of local telephone lines and the principal public long distance telephone transmission facilities. According to the most recent national census, Telmex serves 46 percent of México's 16.5 million homes.<sup>10</sup>

Telmex's local services are organized into three regional segments: North, Metro and South. These regions are further divided into ten sub-regional districts, which handle local exchange services. Telnor, in the Baja California region, operates as a subsidiary and not as a division of Telmex.

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<sup>8</sup> Tomlinson 1995, p 121

<sup>9</sup> Tandon 1994, p 418

<sup>10</sup> Business México, July 1996, p 8

As well as providing local and long distance services, Telmex provides various telephone-related services, including yellow pages and other directory services, 800 service and private branch exchange (PBX) sales and maintenance. 800-number service was introduced in 1988 for the first time and extended to calls to and from the United States in the following year. The company offers call-waiting, speed calling and automatic redialing. Moreover, Telmex is now offering some hot new services, including Internet access, a high-speed data network and videoconferencing.<sup>11</sup>

In order to improve service to large customers, Telmex provides data services through an integrated digital network (RDI) that connected México's 30 largest cities in 1993. Through this network, Telmex provides private business customers access to high-capacity data transmission facilities. For access to the network, customers pay an installation charge and monthly charges.

In addition to wireline communications services, Telmex also provides cellular services nationwide. Telmex competes in each of the nine cellular regions in the country with a local operator.

Telmex's operating revenues are derived for the most part from telephone services, comprising international and domestic long distance and local telephone service. Other revenues are generated by cellular mobile telephone services, directory services and sales and maintenance of PBXs.

For the first nine months of 1994, Telmex reported international long distance phone traffic totaled 1.9 billion billed minutes, a 15-percent increase over the same period of 1993.

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<sup>11</sup> Business Week, May 6, 1996, p 54

Domestic long distance traffic in the same period totaled 4.97 billion billed minutes, an increase of 13.3 percent over the same period in 1993.<sup>12</sup>

### **3.4 NETWORK**

#### **3.4.1 Local Infrastructure**

In early 1994, Telmex's network comprised 8.84 million lines installed, with 7.62 million lines in service, or 8.7 lines in service per 100 inhabitants. Telmex had 6.6 lines per 100 inhabitants in 1990. The network is heavily concentrated in the México City metropolitan area which accounts for around 29 percent of all lines installed. Other areas with high telephone penetration include Monterrey in the state of Nuevo León, and Guadalajara in Jalisco. Together these three areas account for a little under half of all lines in México.<sup>13</sup>

Telmex's 1990 license<sup>14</sup> defined specific network expansion and service targets. These targets included the reduction, by the year 2000, of phone installation delays to one month<sup>15</sup> and the provision of automatic switched service to all cities with over 5,000 persons by 1994. To meet the service targets specified in the license, Telmex initiated a capital investment program. Under this program, Telmex expected to invest over US\$13 billion by 1996.<sup>16</sup>

By December 1994, Telmex had spent \$10 billion on plant and equipment, adding over 3 million new lines, digitizing 2.4 million analog lines, laying 8,400 miles of fiber-optic cable, and co-leading the construction of a trans-Atlantic fiber-optic cable. Telmex's long

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<sup>12</sup> Tomlinson 1995, p 126

<sup>13</sup> Tomlinson 1995, p 122

<sup>14</sup> Modificaciones al Título de Concesión de Teléfonos de México, *Diario Oficial*, Dec. 10, 1990

<sup>15</sup> Based on Telmex's data, the average waiting period in 1993 was around eight months

<sup>16</sup> Tomlinson 1995, p 123

distance network has been completely rebuilt with the most modern technology in the last four years, and now ranks among the world's best. Waiting time for new telephone installations has dropped from six months in 1990 to three weeks, and over 90% of repairs are now completed in 24 hours.<sup>17</sup>

Telmex exceeded its plan to add 750,000 lines per year from 1990 until 1994. For example in 1993, Telmex installed 975,000 lines and 824,000 in 1994.<sup>18</sup> Telmex also planned to increase public payphone density from 0.54 per 1,000 to 2 per 1,000. This would result in the installation of 96,000 public phones in the country and the addition of 77,000 long-distance circuits by 1995. Telmex had more than doubled the number of payphones by 1994, from 83,100 in 1990 to 178,000 by the end of 1993.<sup>19</sup>

The company initiated a program in 1990 to accelerate the expansion of rural telephone service. This expansion was primarily accomplished through a network of multiple access microwave systems. In 1992, Telmex had expanded telephone service to an additional 2,869 rural towns, and to 2,587 more in 1993.<sup>20</sup>

By 1981, 99 percent of the exchanges were automatic; from 1982 on, only digital exchanges were added to the system, thereby raising the percentage of digital lines from almost zero in that year to 22 percent in 1989.<sup>21</sup> By December 1993, 66 percent of all terrestrial lines were connected to digital exchanges as compared to 57 percent at year-end 1992. This increase resulted from the increase of new lines and the replacement of analog

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<sup>17</sup> Forbes, September 11, 1995, p 121

<sup>18</sup> Tomlinson 1995, p 122

<sup>19</sup> Ramamurti 1996, p 74

<sup>20</sup> Tomlinson 1995, p 122

<sup>21</sup> Ramamurti 1996, p 74

lines in service by digital lines. Telmex replaced 261,000 analog lines in 1992 and approximately 925,000 analog lines in 1993. By 2000, Telmex plans to have a 100-percent digital local network.

Telmex also offers fiber-optic-based services to private business customers through the Red Digital Integrada (RDI) or integrated digital network. The RDI is a fiber-optic system for high-speed data transmissions. Another system for private use is an overlay network installed in México City, Guadalajara and Monterrey. This network began to offer service in 1991 and had over 120 customers by 1992, including the largest Mexican banks, two airline companies, and several major industrial companies.<sup>22</sup>

With just 9.6 telephone lines per 100 people in México, compared with 75 lines per 100 in the U.S. and 15 in Argentina, México's telephone market could easily double in revenues by the end of the decade.<sup>23</sup>

Since privatization, Telmex has for the most part been successful in meeting the conditions of its license and sometimes even exceeded them. Nevertheless, the backlog of demand for access lines continues to be a problem. In December 1993, Telmex estimated backlog to be around 300,000 lines. The company receives around 50,000 additional requests for service per month.<sup>24</sup>

### **3.4.2 Long Distance Infrastructure**

The principal features of México's long distance domestic system are a microwave network and a fiber-optic network which duplicates the major transmission routes of the

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<sup>22</sup> Tomlinson 1995, p 123

<sup>23</sup> Forbes, September 11, 1995, p 121

<sup>24</sup> Tomlinson 1995, p 123

microwave network. Telmex acquired the 16,500 kilometer microwave network in 1990 from Telecomunicaciones de México (Telecomm), a state-owned entity. Telmex plans to convert its entire microwave network to digital capacity by the end of 1997. The microwave network links over 6,000 cities and towns and provides cross-border communications along the US-Mexican border.

Telmex continued infrastructure improvement along the US-Mexican border. Since privatization, AT&T and Telmex digitized five border points connecting the two companies. This has further improved telephone service as well as data transmission. By the end of 1994, Telmex increased the number of circuits between México and the United States by 45 percent.<sup>25</sup>

In 1994, Telmex completed construction of a 13,500 kilometer optical-fiber network for domestic long-distance transmission between major cities. The network links 56 cities in México, from Yucatán to Tijuana, and reportedly increased capacity by 120 percent. The network was expected to be the backbone of Telmex's domestic long-distance network.<sup>26</sup>

Telmex's international services are overwhelmingly directed toward North America with a number of interconnection agreements in place with US carriers, including AT&T, MCI and especially Sprint.

International long distance traffic with the United States, Canada and most of Central America is handled by microwave transmission. Traffic with other countries is carried by the Intelsat and Inmarsat satellite systems and by submarine cable. Telmex is the signatory for

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<sup>25</sup> Tomlinson 1995, p 124

<sup>26</sup> Tomlinson 1995, p 5

Intelsat, the international satellite consortium. In 1994, México also became a member of the International Maritime Satellite (Inmarsat) organization.

Telmex leases space on 13 submarine cables for transmission of traffic with Europe, Asia and Australia. In addition, Telmex was part of a group of 61 international communications companies that completed construction of a transatlantic fiber-optic submarine cable, Columbus 2, in 1994. The submarine cable connects Cancún in México with Florida, St. Thomas, Spain, Portugal and Italy.<sup>27</sup>

Columbus 2 initiated service in December 1994. The Columbus 2 Cable consists of two fiber pairs operating at 2.4 gigabits per second between West Palm Beach, Florida, and St. Thomas, US Virgin Islands, offering more than 120,000 derived voice circuits. Beyond St. Thomas a system comprising up to four 560-Mbps fiber pairs will extend service to Italy, Portugal and Spain. An interconnected system using two 560-Mbps fiber pairs will provide service between West Palm Beach and Yucatán, México.<sup>28</sup>

### **3.4.3 The National Satellite System**

The first national satellite system in México consisted of Morelos I and II, launched in 1985. By 1993, the Morelos satellites were both running at full capacity. Therefore, in 1993 and 1994, two second-generation satellites, Solidaridad I and II, were launched. In 1994, México and Brazil were the only two Latin American countries that had launched national satellites.

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<sup>27</sup> Tomlinson 1995, p 125

<sup>28</sup> Tomlinson 1995, p 125

Morelos I and II were built by Hughes Aircraft. Both satellites operate in the C-band (radio, television and telephone signals) and Ku-band (used primarily for public digital voice, data and video transmission networks and for private business services).

Solidaridad I and II, also built by Hughes Aircraft, were launched by the European Space Consortium, Arianespace, in 1993 and October 1994, respectively. The Solidaridad system, unlike Morelos, covers territory outside México.<sup>29</sup>

Both satellites have 18 transponders in the C-band, the same as Morelos, but with greater capacity. The Solidaridad satellites have 16 transponders in the Ku-band with three times the capacity of the Morelos satellites. Solidaridad will also have an L-band. The L-band allows communication links between mobile units of land, water, train and air transportation and their corresponding bases. L-band may be also used for rural telephony VSAT. Coverage by Solidaridad will extend from the southern part of the United States, over México and Central America, and across South America, including parts of Brazil.

The system, in conjunction with the remaining Morelos satellite, will operate over 121 transponders -- a 102 percent increase from 1993.

According to Pyramid's report, satellites in México are used mainly for data transmission and broadcast, although rural voice applications have grown in recent years.<sup>30</sup>

#### **3.4.3.1 Telecomm**

While Telmex is the Intelsat signatory, Telecomunicaciones de México (Telecomm) is responsible for the national satellite system. Telecomm is a government-owned

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<sup>29</sup> Tomlinson 1995, p 142

<sup>30</sup> Satellite Communications, January 1995, p 18

organization established in 1989 that operates México's national satellite network and provides transponder capacity to its largest customer, Telmex. Although the Mexican government owns and operates Telecomm, the government has agreed in principle to privatize the organization.<sup>31</sup> In addition to operating the satellite network, Telecomm offers various telecommunications services, including telegraphic service, public telex, public fax and money orders.

Telecomm's networks include Telepac and the National Telex Network. Telepac uses packet switching technology to transmit data to 55 cities. The National Telex Network has around 17,500 active user lines and 62 telex centers. In addition, Telenales, the national telegraph company is part of Telecomm. Telenales provides some 2,200 towns with telegraph and fax services.

Telecomm operates a nationwide 500-VSAT network with a star configuration using a master station supplied by Scientific-Atlanta. The network is exclusively for data communications. Telecomm also operates a high-capacity TDMA/DAMA network, supplied by Spar Comtel, configured in a mesh formation with 12 nodes throughout the country. The VSATs are used for transmission of voice, data and video transmission at 60 Mbps. In addition, it operates private network services for 250 users. 230 use SCPC links and 20 use TDMA links.<sup>32</sup>

Telepac has rarely been used to support LANs. The reasons include the significant time delay associated with nodal processing and error detection/correction in each juncture of

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<sup>31</sup> This may occur during the second half of 1996

<sup>32</sup> Satellite Communications, January 1995, p 18

the Telepac network, its inability to support the bursty traffic typical of LANs, and its inability to sustain higher transmission speeds or dynamic bandwidth allocation. As a result of an study made by CICESE,<sup>33</sup> it was determined that Telepac's development should occur in three stages: 1) gradual migration from X.25 to frame relay; 2) merging frame relay technology with fast-packet switching technology; and 3) fully implementing a switched multimegabit network. The modernization of the Telepac network is already being carried out. It is believed that once the Telepac network is able to support these technological advances, it can be used as a high-speed backbone network.<sup>34</sup>

#### **3.4.3.2 VSATs**

The market for very small aperture terminals (VSATs) has burgeoned throughout Latin America. The popularity of direct-to-home broadcasting and the ease of use of the VSAT dishes and antennas have made the VSAT market the most growth-intensive of all satellite communications.<sup>35</sup>

### **3.5 MARKET STRUCTURE**

The United States' three largest long distance telecommunications companies, AT&T, MCI and Sprint, forged alliances in 1994 with Mexican firms in order to take advantage of México's US\$4 billion long distance market when it opens to competition in 1997. In addition, the largest independent local telecommunications company, GTE, teamed with a Mexican industrial group, Bancomer S.A., to participate in the long distance market. Baby Bells, Southwestern Bell (SBC) and Bell Atlantic, were already in México by virtue of their

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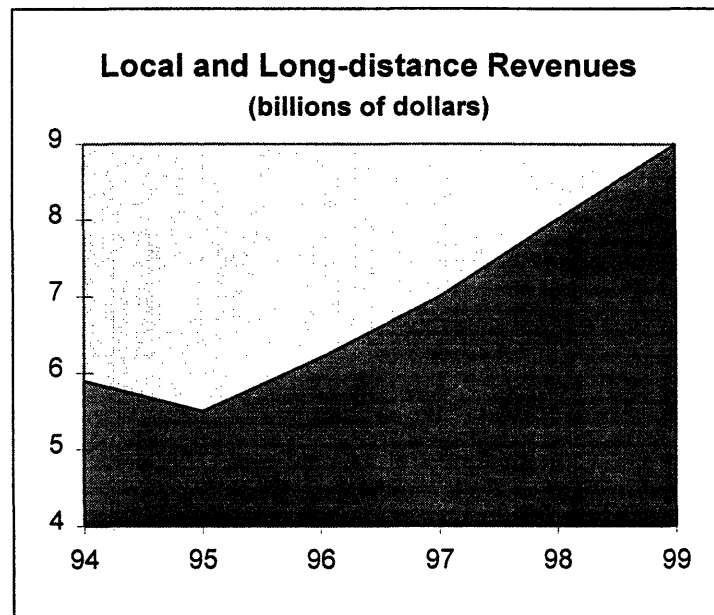
<sup>33</sup> Centro de Investigación Científica y de Educación Superior de Ensenada, BC

<sup>34</sup> Telecommunications, March 1995, p 76

<sup>35</sup> Tomlinson 1995, p 143

existing ownership interest in Teléfonos de México and Iusacell, México's largest private wireless service operator, respectively.

At stake is a fast-growing telephone market (see Figure 3.1). Even with México's stagnant economy, local and long-distance volume is expected to grow close to \$9 billion from the present \$6 billion by 1999.<sup>36</sup>



**Figure 3.1 Local and Long-distance Revenues**

Source: HSBC James Capel, Business Week

Estimates suggest Telmex could lose about 20% of its revenue through 1997, with the loss rising to 40% over the next five years.<sup>37</sup>

México's cellular market, the largest in Latin America, has boomed since its liberalization in 1989. In 1994, the independent cellular company, Iusacell, reported over 50-

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<sup>36</sup> Business Week, May 6, 1996, p 54

<sup>37</sup> Business Week, May 6, 1996, p 54

percent growth. In the same year, a new generation of wireless technologies, cellular digital packet data (CDPD) and specialized mobile radio (SMR), were tested in the Mexican market. In addition, as was previously mentioned, a second-generation satellite, Solidaridad II, was launched in 1994 to handle México's long distance, broadcast and mobile communications traffic. The growth in México's telecommunications industry in 1994 was even more remarkable considering the economic and political events of the year.<sup>38</sup>

The Mexican market for telecommunications equipment is open to all foreign products. Import duties range from 10 to 20 percent. The Mexican market for telecommunications equipment for 1993 was approximately \$2,495.8 million, of which \$710.1 million was imported from the United States. Other major suppliers include Japan, Sweden, Germany, and France.

Prior to the enactment of NAFTA, most of Mexican domestic production of telecommunications equipment was limited to the assembly of foreign components. Manufacturing companies in the Mexican telecommunications sector were mostly subsidiaries of foreign companies. In México, two of the largest manufacturers were Alcatel-Indetel, a subsidiary of the French telecommunications manufacturer, Alcatel, and Ericsson de México, a subsidiary of Swedish manufacturer, Ericsson. These two firms supply most of the major network equipment, such as central office switches, in México.<sup>39</sup>

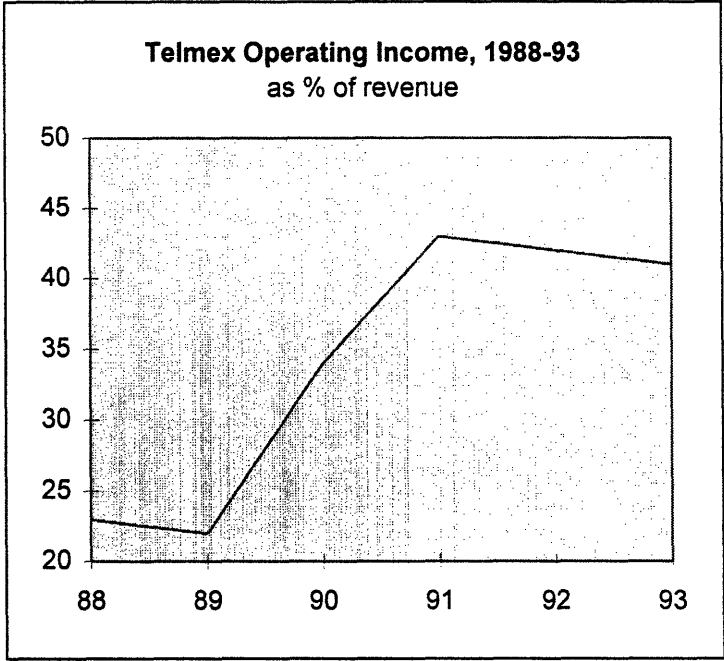
Telmex's monopoly has allowed it to generate one of the highest profit margins of all telecommunication operators worldwide. Its operating income shrank at an annual rate in real

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<sup>38</sup> Tomlinson 1995, p 107

<sup>39</sup> Tomlinson 1995, p 117

terms of 2.8% between 1980 and 1987, but it has grown by more than 40% from the period 1988 to 1993 -- indeed, net annual income growth was almost 80% in real terms only one year after privatization (see Figure 3.2). Furthermore, Telmex's operating income before tax in 1993 was 43% of its revenue, compared to an average 15% for other public telecommunication operators in the OECD area.<sup>40</sup> In the fiscal year ending December 31, 1993, Telmex reported total revenues of US\$7,821 million and a net income of US\$2,889 million.<sup>41</sup>



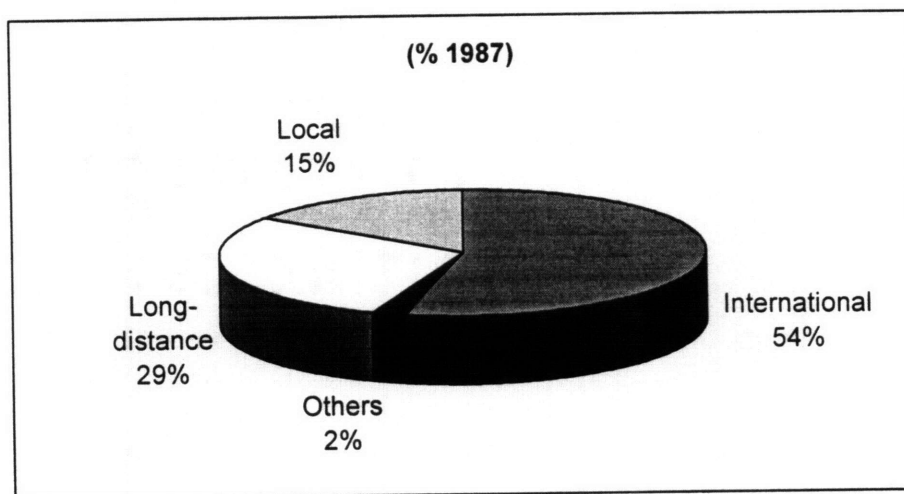
**Figure 3.2 Telmex Operating Income, 1988-93**

Source: Telmex

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<sup>40</sup> The OECD Observer, June/July 1995, p 27  
<sup>41</sup> Financial World, Jan 3, 1995, p 20

It was decided by the government that long-distance telecommunication, one of the most profitable industry segments, would remain reserved for Telmex up to 1997, to allow the company to bring prices more into line with the cost of providing service. Telmex has recognized that the price of long-distance telecommunication service was too high and the price of local service was too low. The tariff rebalancing began in 1987 and since then the composition of total revenues has changed dramatically (see Figures 3.3 and 3.4). The aim was to strengthen the tariff structure with changes that would allow the self-financing expansion of Telmex and to prepare the enterprise for competition in long-distance services.<sup>42</sup>

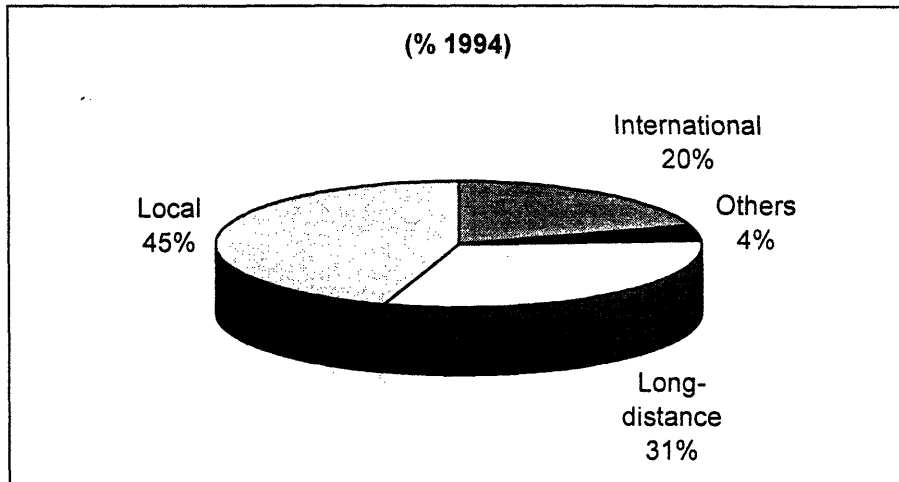


**Figure 3.3 Telmex Revenue Share by Type of Telephone Service, 1987**

Source: Telmex

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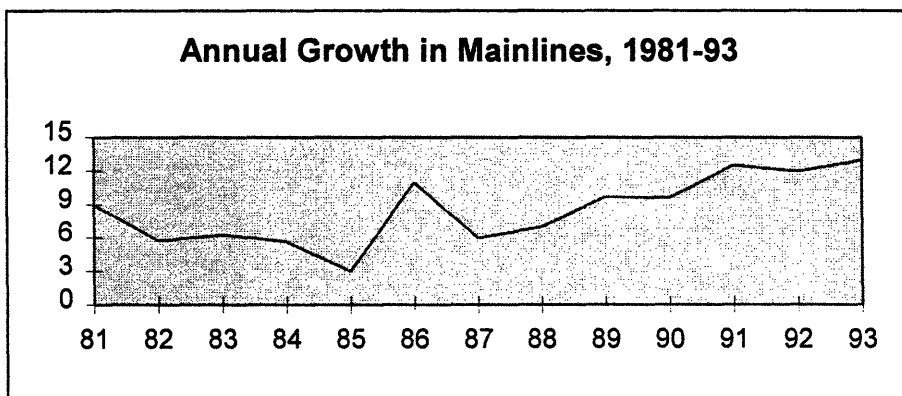
<sup>42</sup> The OECD Observer, June/July 1995, p 27



**Figure 3.4 Telmex Revenue Share by Type of Telephone Service, 1994**

Source: Telmex

To allow the continuation of a monopoly over long-distance services until 1997 Telmex was required to expand its number of subscribers by at least 12% per annum, something the company has achieved to date (see Figure 3.5).



**Figure 3.5 Annual Growth in Mainlines, 1981-93**

Source: Telmex

### 3.5.1 Local Competition

Regulation on this matter is not completely open neither clear. The modified concession given to Telmex in 1990<sup>43</sup> allows companies other than Telmex to build and operate local service networks, but they must be connected to the public network and do not offer long-distance service bypassing Telmex. On the other hand, the Secretariat of Communications and Transportation (SCT) can prevent a company to provide local service in a zone where Telmex is already operating.<sup>44</sup>

Arguing that opening the local market would jump start the development of local telephony in México, Iusacell and other carriers petitioned the SCT to liberalize the local market in 1994.<sup>45</sup>

According to analysts, the SCT continues to favor market liberalization. In early 1995, it was reported that the government would open the local markets to competition within the year. At the time of this writing it has not happened.

The Journal of Commerce also reported that companies like Chicago-based MFS Communications Co., a competitive access provider (CAP), would be interested in the Mexican local market. Another US-based CAP, InterAmericas Communications Corp., was also examining the Mexican market in early 1995. The major existing contender in the local telecommunications market, however, would be Iusacell.<sup>46</sup>

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<sup>43</sup> Modificaciones al Título de Concesión de Teléfonos de México, *Diario Oficial*, Dec. 10, 1990

<sup>44</sup> Martínez 1992, p 258

<sup>45</sup> Tomlinson 1995, p 129

<sup>46</sup> Tomlinson 1995, p 130

### **3.5.1.1 Grupo Iusacell.**

Legally, Iusacell had a nationwide cellular monopoly. But Teléfonos de México, then state-owned, demanded a piece of the cellular action. Iusacell transferred to Telmex its cellular concession for a nationwide cellular system, which Telmex now operates on the so-called B band. In exchange, Iusacell received a license to operate competing A-band cellular service in México City and also kept its national mobile radio concession. Iusacell concentrated on offering better service than Telmex. It was first to introduce cellular voice-mail in México, as well as call-waiting and call-forwarding services.<sup>47</sup>

Iusacell owns and controls a nationwide franchise for a 20 megahertz (MHz) frequency band in the 450-MHz range. The company plans to use this frequency to provide wireless local telephone services (WLTS) to both commercial and residential customers. However, the company had not been issued a license for local service as of this writing. Iusacell has also a long distance concession but it is more interested in offering local service once the government defines the rules for competition in that business.<sup>48</sup>

Iusacell filed technical and economic plans with the SCT on June 17, 1994, to provide local wireless service. In early September 1994, the company began conducting a full commercial trial of the radiotelephony service. By November, the company reported that services had been provided to over 600 participants. At the time, Iusacell filed a suit with the Mexican Federal Courts to urge the SCT to respond promptly to the Company's June 17 filing.

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<sup>47</sup> Forbes, April 11, 1994, p 56

<sup>48</sup> Business Week, May 6, 1996, p 54

Even without a WLTS license, Iusacell plans to spend about US\$800 million by the end of 1999 for WLTS construction, according to Nomura Equity Research. Iusacell and Northern Telecom (NT), a Canadian telecommunications equipment manufacturer, signed a US\$300 million deal for the purchase of switches and base station equipment.<sup>49</sup>

Nomura reported that Iusacell's WLTS network would use digital switching nodes, digital internode transmission links with fiber-optic and microwave interconnections, a high-speed signaling network for call establishment, routing and control, and advanced intelligent network (AIN) hardware/software for network control. Each node would be connected to neighboring switches via a digital transmission backbone to the AIN control points via a high-speed signaling network, and to subscribers through a radio base-station.

Telmex currently charges new customers around \$500 to install a conventional telephone line. The radiophone networks that Iusacell is building would allow it to offer stationary, wireless phones in cities for \$400 and with far shorter waits than Telmex requires.<sup>50</sup>

### **3.5.2 Domestic and International Long Distance Competition**

In August 1996, the Mexican government will auction long distance licenses. In January 1995, it was reported that 40 companies had expressed an interest in participating in the auctions. The Mexican government plans to raise US\$1.5 billion in the auctions.<sup>51</sup>

After Telmex's monopoly on long distance services ends in 1997, the telephone company will be required to provide competitive long distance providers with equal access to

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<sup>49</sup> Tomlinson 1995, p 130

<sup>50</sup> Forbes, April 11, 1994, p 57

<sup>51</sup> Tomlinson 1995, p 118

its local networks. On June 30th, 1994, the Communications Ministry determined that when Telmex's monopoly ends in 1997, users will be able to switch to rival long distance providers without having to use an access code. Telmex will have to allow interconnection between long-distance competitors and its local network in 60 of the country's cities immediately, and in 200 within two years.<sup>52</sup>

From August 1996, rivals will be allowed to carry calls on their own networks; come January 1997, they will be guaranteed access to Telmex's local network for a fee. New entrants required this fee to be less than 3 US cents per minute, Telmex expressed that US 15 cents per minute would be just enough to cover its costs. Negotiations between Telmex and its new competitors did not result in an agreement on this issue. Therefore, the Communications Ministry intervened, as was defined by the law, to resolve such dispute. This fee was set at approximately 5 US cents per minute. With such policy Telmex may lose 30% of its \$4 billion long-distance market in the first year, however Telmex bosses expect to lose a 10%.

Telmex's major weakness is that it will have to subsidize local service for a few more years. Officials set local rates; and the company blames a fall of 16.5% in real terms in first-quarter revenues, revealed on April 22, 1996, on an official refusal to sanction price increases that keep pace with inflation.

At one point, seven rival groups were talking about deploying a fiber-optic triangle to link México city, Monterrey and Guadalajara, the sources of two-thirds of the country's calls.

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<sup>52</sup> The Economist, July 9, 1994, p 64

Now only two groups look like serious rivals: Avantel, which claims to have already laid 2,500 miles of cable; and Alestra.

Against them, Telmex has some advantages. Since privatization, it has improved its network by making \$11 billion of investments. Call-completion rates have surged, operating costs have plunged and service has improved. Nearly 90% of the system is now digital, up from less than 30% in 1989; as a result, the firm is now able to offer services such as call-waiting and caller identification.

Moreover, Telmex's continuing monopoly on local service will steer many callers to its long-distance service, as will its alliance with Sprint. Other traffic may come from SBC, whose recent merger with Pacific Telesis makes it the main source of calls from the United States to México.<sup>53</sup>

México's long-distance market is particularly attractive to US companies. Cross-border telephone traffic between the two countries accounts for more than 2 billion minutes annually and represents the second largest telecommunications traffic stream in the world. The consumer market supports most of this exchange. In 1994, residential consumer calling comprised approximately 70 percent of the calling volume between México and the United States.

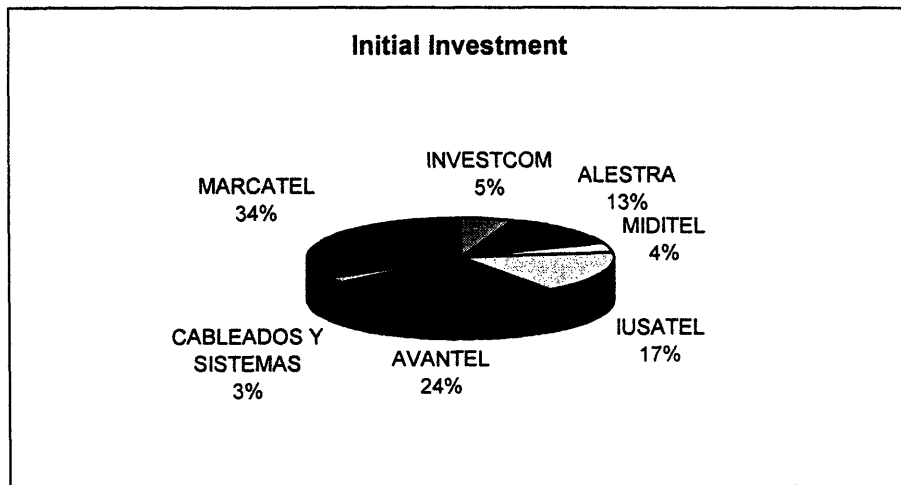
Telmex's service market for domestic and international long-distance telecommunications in 1993 generated \$4.3 billion, with domestic long distance revenues of approximately \$2.7 billion and international revenues of \$1.6 billion. In 1993, total long-distance revenues grew 15.3 percent and were expected to continue to grow rapidly as a

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<sup>53</sup> The Economist, April 27, 1996, p 73

result of NAFTA. The Mexican government aims to enhance the Mexican business environment by modernizing the country's telecommunications infrastructure.<sup>54</sup>

Figure 3.6 shows the distribution of initial investments planned by the companies that are committed to compete in the Mexican long-distance market.



**Figure 3.6 Initial Investment Distribution**

Source: Bursametrika Management

### **3.5.2.1 MCI-Banamex's Avantel**

MCI is the second largest US long distance company. In 1993, MCI reported revenues of nearly \$12 billion. MCI is the leading supplier of digital private line services from the United States to México. The company offers these services over digital satellite networks with more than 26 major earth stations in México, Panama, Costa Rica, Venezuela, Brazil, Chile and Argentina.

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<sup>54</sup> Tomlinson 1995, p 132

In January 1994, MCI teamed with Grupo Financiero Banamex-Accival (Banacci), México's largest financial group, to form a joint venture in México. Through this enterprise, MCI expects to construct an integrated North American network, capable of providing services with identical features to customers throughout the continent. According to MCI, the Banacci-MCI joint venture will apply for a license to offer a range of domestic and international long-distance telecommunications services -- switched and non-switched voice, data and image -- to business, government and residential customers throughout México.

In October 1994, MCI and Banacci announced the launch of their joint venture, called Avantel S.A. The joint venture, 55-percent owned by Banacci and 45-percent owned by MCI, began operations in October 1995. At that time, the joint venture assumed responsibility for managing Banamex's existing private network, Infratel. Infratel is a private network linking over 250 cities in México. Banamex, a wholly-owned subsidiary of Banacci and the largest Mexican bank, offered private telecommunications services to major businesses through Infratel. Under existing regulations, up to 30 percent of Infratel's network capacity could be sold. As well as the Infratel network, Banacci brought to the venture a substantial commercial customer base, around 110,000 according to Banacci officials.<sup>55</sup>

Avantel intends to invest an initial US\$650 million (MCI contributing US\$150 million and Banacci the remainder) to construct a fiber-optic network that would provide the full gamut of MCI voice, data and video services throughout México. The network would include a series of "crystal triangles" of fiber-optic cables linking the major industrial centers of México City, Guadalajara and Monterrey. In addition, the network would include cities in

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<sup>55</sup> Tomlinson 1995, p 133

north and central México. MCI announced that Avantel planned to expand the fiber network throughout the country, extending it over 12,000 miles by 2000. This would require an investment of up to US\$1.8 billion.

### **3.5.2.2 *Sprint-Telmex***

Sprint is the third largest US long distance telephone company. Through its international subsidiary, Sprint International, the company provides service links throughout Latin America through interconnection agreements with México, Brazil, Colombia, Honduras and Puerto Rico.

In mid-1994, Sprint and Iusacell entered into an exclusive memorandum of understanding to form a joint venture that would seek authorization from the Mexican government to provide national and international long-distance telecommunications services in México. The alliance fell through in late 1994 and Sprint quickly made a deal with Telmex. Some analysts believed that Sprint changed partners because the company had found a better deal. A Iusacell spokesperson said that the cellular company “doubted” Sprint’s commitment to México.<sup>56</sup>

In December 1994, Sprint agreed to form an alliance with Telmex. Under terms of the agreement, the two companies would begin planning a suite of cross-border voice, data and video services. These services would begin after the definitive agreement was signed. Sprint would not be required to invest in a long distance license. Also, Sprint would transfer any necessary network software or other intellectual property to Telmex, at market value, to enable the two networks to interoperate.

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<sup>56</sup> Tomlinson 1995, p 134

### **3.5.2.3 AT&T-Grupo Alfa-GTE-Bancomer (Alestra)**

In November 1994, AT&T and Grupo Alfa, a Mexican industrial consortium, announced an alliance. According to a memorandum of understanding, Alfa and AT&T would form a joint venture in which Alfa's share of the voting equity would be 51 percent and AT&T would be 49 percent. An investment of US\$1 billion would be spread out over a period of four to six years.

Alfa is a \$2.5 billion global company headquartered in Monterrey, México. The company has a diverse portfolio of steel, petrochemical, textile and food businesses and is a partner in 15 strategic alliances with companies in Asia, Europe, Latin America and the United States.

According to the companies, the alliance would combine the strength of AT&T's brand, product and services range, reputation for quality, technology and network expertise with Alfa's broad customer base and experience in the Mexican market.<sup>57</sup>

GTE Telephone is the largest US-based local telephone company, providing voice, data and video products and services through more than 22 million access lines in portions of the United States, Canada, South America, the Caribbean and South Pacific. Its parent organization, GTE Corp., is the fourth-largest publicly owned telecommunications company in the world.

In late September 1994, GTE Telephone Operations, Valores Industriales (VISA) and Grupo Financiero Bancomer (GFB) signed a memorandum of understanding to form an alliance -- called Unicom -- that would explore the provision of telecommunications services

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<sup>57</sup> Tomlinson 1995, p 135

in México. The companies said the alliance would study opportunities available in México's public telecommunications market, including the country's long-distance market.

VISA is a major Mexican industrial group which, through its main subsidiary FEMSA, has interests in beverage manufacturing, convenience stores and packaging materials. GFB was formed in 1991 and owns Bancomer, México's largest retail bank. GFB serves all of México's territory with the nation's largest distribution network based on its branch and automatic teller machines network.

Alestra -- original name for the joint venture between AT&T and Alfa -- got a big boost through its April 22, 1996 merger with Unicom. The purpose of this was to jockey for a more favorable competitive position in the market, principally against Telmex. The new shareholding structure breakdown as follows: Mexican partners, Alfa, will retain 25.6 percent of the shares, Bancomer/Visa, 24.4 percent; and the foreign investors, AT&T, with 20 percent and GTE and Telefónica de España, with 14.5 percent each.<sup>58</sup>

The company intends to market its products under the AT&T name, which is well recognized in México through equipment sales.<sup>59</sup>

#### **3.5.2.4 Marcatel**

Marcatel was formed at the end of 1994 and in June 1995, it announced its administrative plan involving Radio Beep, dedicated mainly to personalized radio-telephone services. Fifty-one percent of the stocks is held by Marcatel, 24.5 percent by IXC Communication and Westel Line holds the remaining 24.5 percent.

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<sup>58</sup> Business México, July 1996, p 12

<sup>59</sup> Business Week, May 6, 1996, p 54

Marcatel's investment program calls for US\$2.5 billion, the largest of any considered. It proposes the construction of 11,700 kilometers of fiber optic network over five years, to be complemented by a range of services such as Personal Communications Services (PCS), and value-added services (data transmission).<sup>60</sup>

#### ***3.5.2.5 Iusatel***

This is the child of a previous alliance between Iusacell and Bell Atlantic who principally participated in cellular telephone service in México. Iusacell holds 58 percent of Iusatel's stock, with Bell Atlantic holding the remaining 42 percent.

In 1995, the company announced an investment program of US\$1.3 billion, for the construction of a 14,000 kilometer fiber-optic network to be built within five years.<sup>61</sup>

#### ***3.5.2.6 Investcom, Miditel and Cableados y Sistemas***

There are also three smaller companies jumping into the telecommunications market:

Investcom is formed by Compañía San Luis with 51 percent of the company's stock, and Nextel, LCC and Carlyle holding the remaining 49 percent. The group is planning to invest US\$412 million.

Miditel is wholly-owned by Antonio Canahuati who proposes to invest US\$300 million to build up niche markets in long-distance service.

Cableados y Sistemas is owned by the Vázquez family of Guadalajara. This company operates cellular telephone companies in Northwestern México. The company represents a bond between the United States border cities and the triangle formed by Northern Baja

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<sup>60</sup> Business México, July 1996, p 10

<sup>61</sup> Business México, July 1996, p 13

California and the states of Sonora and Sinaloa. With an investment of US\$200 million, it plans to construct 2,240 kilometers of fiber-optic lines.<sup>62</sup>

### **3.5.3 Cellular Network**

The opening of the mobile communication services market in 1989 proved very successful, virtually from the first day of service, and by the end of 1994 there were more than 560,000 subscribers. Indeed, the penetration rate in México after five years was ahead of ten other OECD countries including Belgium, the Netherlands, Spain, and Turkey after the same period of development. To an extent, this growth may reflect unmet demand on Telmex's fixed network but higher prices make mobile communication a relatively expensive substitute. The major difference with these countries was that México has a competitive mobile market while all the others still had monopolies five years after the launch of the service.<sup>63</sup>

México's cellular market was opened in March 1989 and has enjoyed rapid growth in the 1990s. In 1994, México had the largest cellular market in Latin America, making up 26 percent of the total Latin American and Caribbean cellular markets.

Bilateral radio frequency agreements and protocols announced following the June 1994 meeting of the US-México High-Level Consultative Commission on Telecommunications gave a boost to cellular service providers. The radio frequency agreements with México permit cellular roaming along the US-México border.

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<sup>62</sup> Business México, July 1996, p 13

<sup>63</sup> The OECD Observer, June/July 1995, p 28

The government divided the country into nine cellular regions. There are two bands in the larger regions. The A-band licenses were open to bidding while the B-band licenses were awarded to Telmex's cellular subsidiary, Telcel. The A-band operates in the 840-860 MHz frequencies and B-band operates in the 920-940 MHz frequencies.<sup>64</sup>

In 1994, Telcel had an estimated national market share of 50 percent. There were nine operators, each competing with Telcel in one of the nine cellular regions. Four of the operators are wholly-owned by Telcel's leading competitor, Grupo Iusacell, and four operators are partially-owned by Motorola Inc.

### ***3.6 CONCLUSION***

The key lesson that we should get from the information presented in this chapter is about change. About how the opportunities that telecommunications now offers to Mexican consumers have changed dramatically in the last few years. Less than ten years ago, nobody in México had used a cellular phone, now they are widely available. At that time, most households had rotary telephones connected to analog switches; now most telephones -- at least in urban areas -- are connected to digital switches and have keypads.

It is not the current situation that should make us feel comfortable but the pace of change. We should remember that all these changes have occurred before foreign firms are operating in México.

With Telmex's privatization the government has balanced the need for better telecommunication services, that may benefit the population as well as provide a more

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<sup>64</sup> Tomlinson 1995, p 137

propitious environment for firms to establish in Mexican territory, with Mexican enterprises' right to compete in such market in fair conditions.

The fact that Telmex had been enjoying monopolic conditions for so many years does not mean that it should be treated unfairly against foreign competition. Telmex is now prepared to compete with foreign giant firms as AT&T, MCI, etc.

However, all this competition seems to be too much focused towards the areas where telephone service is more accessible -- big cities, urban areas. It is not quite clear yet how and who will be responsible for the improvement of rural telephony.



## **4. TECHNOLOGICAL ALTERNATIVES**

### ***4.1 INTRODUCTION***

In this chapter I will discuss those technological developments that have kept a strong relationship with telecommunications. They will be presented in two dimensions. First, an overview of basic technological applications that work as enablers for more recent services. Second, emerging telecommunication technologies and its current status within the Mexican environment will be reviewed.

Additionally, after this introduction, a comment is made about the importance of adequately managing these alternatives.

### ***4.2 TECHNOLOGICAL TRENDS***

One of the key aspects that makes the field of telecommunications so exciting is the constant and rapid technological change, a characteristic that is predicted to continue for the foreseeable future. Often, as new technology becomes available, the potential uses of it are not immediately evident. People must become familiar with the technology and figure out how it might be applied to solve a problem or to do something that has not been done before.

The pace at which new product and process technology is generated throughout the world has grown exponentially, creating new markets and rapidly changing sources of competitiveness. New developments in science and engineering, and increasingly sophisticated consumers have provided the technological capabilities and market incentives to benefit from the development of new products and services. With rapid changes in technologies, the traditional bases for corporate decisions to deal with them are less and less

effective. Most firms take a pragmatic approach toward managing technology; they do not view it as a distinct art or as being any different from overall corporate management.

Given the nature of international competition and the many sources of new technologies, companies must develop technology strategies for maximizing competitiveness.

Effective work in the field of management of technology can play a crucial role in devising the strategies and imparting the skills and attitudes to Mexican engineers and managers that they will need in the future technology-dominated economy.

When talking about technological alternatives we should be aware of what the primary industry needs are: 1) How to integrate technology into the overall strategic objectives of the firm; 2) How to get into and out of technologies faster and more efficiently; 3) How to assess/evaluate technology more effectively; 4) How best to accomplish technology transfer; 5) How to reduce new product development time; 6) How to manage large, complex, and interdisciplinary or interorganizational projects/systems; 7) How to manage the organization's internal use of technology; 8) How to leverage the effectiveness of technical professionals.<sup>1</sup>

To be effective in the field of management of technology strong collaborative efforts among government, industry, and academia will be required in México.

#### **4.2.1 Trends in electronics**

The capabilities of electronic circuit chips have been increasing exponentially and are continuing to do so. Microprocessor chips are becoming ubiquitous. The price-performance

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<sup>1</sup> National Research Council 1987

of memory chips, microprocessors, and other related electronics has been coming down at a rate of 20 percent per year, compounded. In communications equipment, microprocessors and memory chips find many uses: adding intelligence to telephones and modems, and allowing more memory buffering capability in PBXs and front-end processors are two examples.

One type of microprocessor, called the *digital signal processor (DSP)*, is having an especially significant impact. Digital signal processing is the technique of using microprocessors to analyze, enhance, or otherwise manipulate sounds, images, and other real world signals. A DSP chip processes a digitized signal through a series of mathematical algorithms over and over again to manipulate the signal. Before DSP chips became available, analog techniques that processed signals in their original wavelike form were used, but analog signal processing is much slower and less accurate than the digital method.<sup>2</sup> Applications of DSP that are of particular interest in communications are voice compression and video signal compression. The objective of compression is to reduce the number of bits required to carry a digitized signal while still maintaining its unique characteristics and quality. Another application for digital signal processing techniques is speech recognition.<sup>3</sup>

#### **4.2.2 Trends in communication circuits**

The single most universal trend with communications circuits is the rapid advance toward end-to-end digital capability. The advantages of digital transmission are clearly recognized, and most of the common carriers are moving as rapidly as possible to install the

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<sup>2</sup> Rowe 1988, p 470

<sup>3</sup> Rowe 1988, p 471

electronics that can handle digital signals in their central offices. The carriers are also converting microwave radios from analog to digital transmission, and installing fiber optics circuits to provide the high bandwidth that digital transmission requires.

Two major trends in satellite technology will impact the way satellite transmission is used in the future: higher bandwidth and more powerful satellite transmitters. The higher bandwidth is needed to help keep the cost of satellite transmission competitive with fiber optics. The more bandwidth that can be placed on a single satellite, the fewer satellites that are needed and the lower the cost. Higher-powered transmitters in the satellite allow the receiving dishes on the ground to be smaller, but the trade-off is that larger solar panels and batteries are required on the satellite.

Optical fiber technology is making the biggest impact on design of communications circuits today. Common carriers, as well as many private companies, are installing fiber cables at an unprecedented rate. While 45 million bits per second (Mbps) is the most common rate for digital transmission on a fiber optic circuit today, transmission rates of 135 Mbps are becoming common too; rates of billions of bits per second have been tested under laboratory conditions.<sup>4</sup> Another factor that affects the economic viability of fiber optic transmission is the distance between repeaters. Today, using single-mode fiber, a distance of 50 to 60 kilometers is common, but distances of 100 to 120 kilometers between repeaters are becoming feasible.<sup>5</sup>

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<sup>4</sup> Rowe 1988, p 472

<sup>5</sup> Rowe 1988, p 473

### **4.2.3 Trends in the application of communications technology**

The deregulated, competitive environment, coupled with the rapid technological advances, act as an enabler for new communications applications.

Telecommuting is the use of an alternate work location for employees who are normally based in the office. Telecommuters typically work at home and use the telephone, modem, and a personal computer connected via telephone lines to the computer at the office. It should be emphasized that telecommuting is not a future application of communications technology, but is in widespread use today. Examples abound, and as our society gets used to the concept of having workers at home, telecommuting will become more widespread.

*Electronic data interchange (EDI)* is the use of communications techniques to transmit documents electronically. The term is most frequently used in a business context today, but there is no reason why EDI techniques cannot be used by consumers as well. EDI relies primarily on the development of standard formats for various business documents such as invoices, purchase orders, and acknowledgments. The benefits of EDI are the more rapid transmission of the documentation supporting the business activities and transactions, and the elimination of paper. These can lead to other benefits, such as reduced inventory levels or faster collection of money from creditors. All of the technology required for EDI is in place today. The banking and retail industries have been leaders in developing the EDI capabilities, and the techniques are now spreading to other industries and across industry boundaries.

Voice messaging is another application area where all of the technology is available. To date, voice messaging has been primarily implemented by companies on a private basis

for the use of their employees. Telephone companies are starting to offer its customers a voice messaging capability as an adjunct to standard telephone service.

Automobile navigation by satellite is an application in which a car equipped with a small television-like device is capable of displaying a map of the local area. A transmitter in the car would send a signal to a satellite, which would calculate the location of the automobile and send a signal back to the car. A microprocessor in the car would translate the signal from the satellite and display the location of the automobile on the map. With the increasing bandwidth of satellites and the decreasing cost of the electronics required in automobiles, the application is coming closer to being affordable in the consumer market.<sup>6</sup>

The development of wireless telecommunication is the fastest-growing of all communications technologies. In the coming decades, its growth will be even dizzy, thanks to two technological breakthroughs that support these communication systems. These are the creation of "smart" communication networks and digital communications.

A smart network is one which can easily identify an out-of-town user passing through the area it covers, making available the necessary services to provide him or her with the services required. Among these resources are switchboards, databases and large service facilities connected to the cells, and the communications equipment, carrying a call from one place to another, as if in a kind of relay race. These tools make it possible to build smart networks, capable of offering advanced, multimedia communications services wherever there is someone with a receiver.

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<sup>6</sup> Rowe 1988, p 480

Together with the proliferation of these networks, the most recent breakthroughs in software, microelectric components, transmission and digital-signal processing have given rise to increasingly versatile, compact, and economical portable equipment. More than compact telephones with illuminated screens and keypads like many cellular telephones used daily, the new cellular communications equipment consist in apparatus inspired by the Personal Digital Assistant, or PDA concept. Generally speaking, a PDA is an ultracompact computer connected wirelessly to a smart network.<sup>7</sup> It looks like a thick electronic diary, with a bigger screen. Some of these new devices fit into your hands, like a portable video game. Through a flat screen and an advanced graphic interface, a PDA can be used as a cellular phone, can send and receive faxes, transmit voice, text, data, and even video simultaneously, and in some countries, with a PDA, you can exchange e-mail. However, a PDA needs the support of a Personal Communication Service (PCS), or a cellular provider.

In México, where the telephone density is still at a low level, the new wireless technology could represent a quick, low-cost alternative to cover the basic communication requirements of the bulk of the population. For now, these technologies are being focused on the highly profitable markets of business and wealthy families in México, so their prices are not likely to be affordable to the majority of people. Nevertheless, the technology is here and it is expected to reduce in cost as more people subscribe to a PCS.<sup>8</sup>

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<sup>7</sup> Business México, Oct. 1995, p 30

<sup>8</sup> Business México, Oct. 1995, p 30

### ***4.3 MEXICAN TECHNOLOGICAL ENVIRONMENT***

#### **4.3.1 Overview**

Due to the recent privatization schemes in Latin America, governments and private entities are committed to investment programs that would expand and upgrade existing networks. In addition, foreign and local investors introduced new communications technologies, such as cellular and specialized mobile radio (SMR), which would both supplement and compete against the insufficient basic telephone service.

Without exception, each country in Latin America has planned to increase and modernize its telecommunications network. Economic and commercial interests, however, are not the only inducements for expansion of telecommunications networks. According to Communications International, "Latin Americans are avid users of the telephone. The only ones who do not use it to excess are the ones who have no phone at all."<sup>9</sup> To meet these demands, Latin American governments have devised investment plans to expand the telecommunications networks.

Investors, foreign and local, have sought to take advantage of the region's high demand for telecommunications services and the need to modernize Latin American networks through projects to expand submarine cable systems and optical-fiber terrestrial cable networks and to provide mobile and very small aperture terminal (VSAT) satellite systems.

According to TelePress LatinoAmerica, Latin American governments, not including foreign private investors, invested over US\$200 million in 1993 and US\$300 million in 1994

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<sup>9</sup> Tomlinson 1995, p 3

in optical-fiber cable systems. If the trend continued, it added, the governments of Latin America would invest around US\$1 billion in optical-fiber systems by 2000.<sup>10</sup>

Expansion of Latin American networks has increased the number of lines per person - a statistic distorted by a highly disproportionate distribution of lines in urban areas.<sup>11</sup>

With 91 million people,<sup>12</sup> México offers a vast audience for basic telephone as well as advanced services which have the benefit of prior testing in more developed markets. México's territory of 764,000 square miles includes diverse terrain of mountains and deserts, rural and metropolitan districts. Provision of service in all these areas offer immense potential for a variety of telecommunications systems, whether based on satellite, wireless or wireline systems.<sup>13</sup>

### **4.3.2 New Developments**

#### ***4.3.2.1 Asynchronous Transfer Mode***

ATM is a high-velocity, highly reliable system that uses fiber-optic lines. However, unlike frame relay lines, which are used for only one transmission, the ATM lines use sophisticated technology which uses lapses in one transmission to send another transmission over it, like passengers on a double decker bus.<sup>14</sup>

ATM technology uses at least 2 million bits per second which makes it much more efficient than frame relay, which uses about 64,000 bits per second.

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<sup>10</sup> Tomlinson 1995, p 4

<sup>11</sup> Tomlinson 1995, p 5

<sup>12</sup> Population and Household Count 1995

<sup>13</sup> Tomlinson 1995, p 107

<sup>14</sup> Business México, July 1996, p 18

Frame relay and ATM have only been in use in México for about a year due to the previous lack of fiber-optic infrastructure. And while ATM has the potential to meet the demands of large corporations such as banks and television companies, so far, only the telephone sector has sufficient digital channels (fiber-optic lines) to use ATM. Its use will be expanded as more fiber-optic cables are laid.

ATM figure prominently in the current telecommunications trends toward standardization, globalization and a more widespread availability of multimedia networks. These networks will eventually provide data, voice, image, and video to the end user at each workstation.<sup>15</sup>

There are still a few problems. Telecommunications technology, researched and developed in other countries, reaches México with a steep price tag.

Also, the technology is not applicable in all areas due to topographical obstacles. Laying fiber-optic cable underground is simply not feasible in very mountainous regions. Efforts have been made to overcome these problems, and alternatives exist as those described in the following sections.

#### ***4.3.2.2 Personal Communications Services***

In November 1994, Cedetel reported the Mexican government had been discussing personal communications services (PCS) licensing. In 1996, México had not formulated any specific plans for PCS, either in the number of licenses and in how those licenses should be awarded.

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<sup>15</sup> Business México, July 1996, p 50

A regional analyst forecast that PCS would not generate a substantial amount of interest in the short term. His theory was that competition is not developed enough in México to attract competitors to the market. Instead, investment would go to building out the existing wireline and cellular networks.

#### **4.3.2.3 Internet**

Until 1993, the Mexican part of the Internet had been managed and operated through several universities organized under the name MEXnet. Universities, not businesses, were the main users of MEXnet. The network was supported through academic funding.<sup>16</sup> Registered networks in México have grown 331 percent from September 1991 to August 1993, according to the Internet Network Society, as reported in Network World.

A network backbone, in place since 1992, connected these institutions nationwide. However, the bandwidth, generally running at a low speed of 64 Kbps,<sup>17</sup> was not sufficient for the very rapidly growing number of users. This caused networks bottlenecks, especially in the international connection.

With the explosive growth in Internet use generated by the World-Wide Web, many firms in México started using it. By 1995 there were more than 50 Internet Service Providers operating in México. Today, Internet access is widely available throughout all the country.

Following that trend, firms, universities, and even the government, have Web sites and have been investing more in infrastructure for the use of the Internet. However, as it may

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<sup>16</sup> Tomlinson 1995, p 145

<sup>17</sup> México adopted the European standards for communications, E1 instead of the US standard, T1.

be expected, Internet access follows the same pattern of telephone penetration, it is highly concentrated in some urban areas and almost inexistent in a considerable part of the country.

#### ***4.3.2.4 The Air-to-Ground Market***

Since 1993, México has had an analog ground-station network in place, serving planes with analog air-to-ground systems. More and more planes are using digital air-to-ground systems. For this reason, in 1994 México began to install additional base stations to upgrade the network to a digital platform.

Aerocomunicaciones S.A. de C.V., a joint venture between GTE Airfone and Telmex, completed construction of five digital ground stations in July 1994 in México. This represents the initial phase of a nationwide network of digital stations that will support GTE's air-to-ground system, GenStar. The complete Mexican digital network will provide nationwide coverage to México's major population centers.

The ground stations pick up and relay telephone signals from airplanes within a radius of 200 miles. The digital stations began operating along the same air corridors as the existing analog stations.<sup>18</sup>

The network in México will link with GTE's digital US network to provide seamless call coverage on flights to and from the United States. In July 1994, GTE had installed the GenStar telecommunications on an Aeroméxico aircraft. The system enabled passengers to receive phone calls from the ground, send and receive data from laptop computers and send and receive facsimile messages. GTE said it would install the systems in about 25

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<sup>18</sup> Tomlinson 1995, p 146

Aeroméxico and Mexicana Airlines planes. The two airlines were among the first foreign-based carriers to install the all-digital system.

#### **4.3.2.5 Cellular Digital Packet Data (CDPD)**

CDPD is a cellular application for data transmission only. By using frequency hopping or dedicated channels, data is transmitted in packets at a raw data rate of 19,200 bits per second. The benefit of CDPD is that the technology is overlaid on an existing cellular network. Integrating CDPD into cell sites costs approximately 5 percent to 10 percent of the initial investment for a cellular network. Another benefit is the industry's acceptance of CDPD. Several manufacturers have committed to manufacturing the terminal and radio modem equipment, as well as software required for CDPD.

In November 1994, US-based Hughes Network Systems Inc., a subsidiary of Hughes Aircraft Co. responsible for advanced digital telecommunications, signed an agreement with Iusacell to provide a cellular digital packet data (CDPD) system in México. With the implementation of this agreement, México would become the first Latin American country to deploy CDPD technology.

Hughes had covered 30 percent of the existing cell sites in México City by late 1994, with no planned rollout schedule. Expansion of the CDPD system would be market-driven, according to Hughes.<sup>19</sup>

#### **4.3.2.6 Specialized Mobile Radio Market**

Specialized mobile radio (SMR) appears to be a promising subsector of the Mexican telecommunications market. The 1994 Work Plan of the Secretariat of Communications and

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<sup>19</sup> Tomlinson 1995, p 147

Transportation (SCT) noted that Mexican SMR operators had roughly 24,000 subscribers at the end of 1993. There were 21 trunking licenses granted in México as of year-end 1993 and the SCT reportedly planned to issue up to 50 SMR licenses during 1994. In addition, the SCT forecast that the SMR market could reach 90,000 subscribers by the end of 1994.

In 1994, several Mexican trunked radio services providers established partnerships with US service and equipment companies. In June 1994, Nextel Communications Corp., a US-based SMR operator, announced plans to invest US\$165 million for a 22-percent stake in Corporación Mobilcom, a Mexican radio dispatch firm. Mobilcom has licenses to operate in the 800-MHz band in regions covering about 75 percent of the Mexican population.

Mobilcom expects to provide a range of wireless telecommunications services over its nationwide networks to serve México's largest industrial centers. The 800-MHz licenses granted by the Mexican government to the companies owned by Mobilcom include a dominant position in México City, channels in Guadalajara, Monterrey, Acapulco and Tijuana, as well as channels covering México's major highways. Under the terms of the agreement, Nextel could purchase an additional 20.65 percent of Mobilcom until 1997.<sup>20</sup>

Through this alliance, combined with a similar alliance in Canada, Nextel plans to build an integrated, all-digital wireless communications network throughout the North American continent.

Nextel and Mobilcom also agreed to pursue sharing frequencies along the border between the United States and México. This would create additional capacity for Nextel's network in the United States, particularly in Southern California and Texas.

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<sup>20</sup> Tomlinson 1995, p 148

In February 1994, Geotek Communications Inc., a US-based global positioning and communications company, and partner George Soros signed a letter of intent to purchase a 30-percent interest in Mexican cellular radio company, RadioCel, for \$24 million. This deal fell through later in the year -- with Geotek announcing the company would renew attempts to ally with RadioCel or other Latin American companies -- and Latin American Telecomm Report suggested that Geotek's attempts to enter the Mexican market underscored the importance of the Mexican market as a "testing grounding for advanced wireless communications products and services."<sup>21</sup>

#### **4.4 CONCLUSION**

Advanced alternatives that a few years ago could not have been imagined as part of the Mexican spectrum of telecommunication services are now available or at least soon-to-be implemented.

Access to the Internet and its World-Wide Web, use of Electronic Data Interchange and extended LANs are part of everyday operations within firms in México. The customer base outside firms is also growing rapidly.

Based on what have been discussed in the last two chapters, the free action of market forces should be accountable to great extent for the widespread availability of these telecommunications applications. However, measures should be taken to avoid that the path dictated by these new developments reinforce the profound inequalities that already exist in México with regard to access to modern services.

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<sup>21</sup> Tomlinson 1995, p 148

Moreover, as a close followers of leading edge technology developments, principally those of the United States, we should maximize the benefits that newer technologies bring to us by choosing those that are best suited to our needs, rather than trying to adopt any new development that is available elsewhere.

## **5. POLICY ISSUES**

### **5.1 INTRODUCTION**

This chapter is divided in three sections. The first section describes the current laws that apply to telecommunications in México and underlines the main changes that these regulations have suffered in the last two years. It also explains the structure of the agency responsible for telecommunications policy in México. The legal justification for Telmex's privatization is also presented in this section.

The second section gives a theoretical framework for the micro- and macroeconomic implications of a privatization program.

In the light of that theory, the last section analyzes some of its effects within the Telmex context, and reviews the role of several stakeholders.

### **5.2 REGULATORY FRAMEWORK**

#### **5.2.1 Regulatory Structure**

On May 18, 1995 the Mexican Congress approved one of its most important laws in the last 50 years: the new Ley Federal de Telecomunicaciones, or Federal Telecommunications Law.<sup>1</sup> On June 7, the law was officially published in the *Diario Oficial de la Federación*, the Mexican government's newspaper, going into effect the next day.

With this new law, which replaces an obsolete law issued in 1934, the Mexican government is trying to cope with today's demand for state-of-the-art telecommunications

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<sup>1</sup> Ley Federal de Telecomunicaciones, *Diario Oficial*, June 7, 1995

services and to respond to its economic crisis by promoting competition, increasing foreign investment and avoiding red tape.

The new regulatory structure allows for the introduction of services derived from emerging technologies such as PCS, and includes a new licensing structure and a new auction process. Frequencies will be assigned in a public auction process which is expected to increase investment, as well as service coverage and service diversification.

Some of the most important achievements of this law are granting licenses to private companies to build and operate private satellites and providing satellite services in México using foreign satellites. Assigned orbits and frequency management will be the sole domain of the state. However, the space segments will be licensed to private companies to increase the number of Mexican satellites.

Another remarkable achievement of this law is allowing private investment in Telecomm, the state-owned satellite telecommunications monopoly. The creation of a new company was announced that will replace Telecomm. This satellite operating company will have partners from several sectors, including telephone companies such as Telmex, Avantel, Alestra; satellite operators such as PanAmSat and Orion; and manufacturers such as Deutsche Aerospace and Hughes. With an investment of approximately \$1.5 billion dollars, the company will be public and included in the Mexican Stock Exchange.

Prior to the formation of such a company, Telecomm will be restructured and telegraph operations will be separated from satellite operations.<sup>2</sup>

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<sup>2</sup> Satellite Communications, August 1995, p 19

This Federal Telecommunications Law and the Telecommunications Regulations,<sup>3</sup> adopted in October 1990, provide the general legal framework for the regulation of telecommunications services in México. Under the Telecommunications Regulations, a provider of public telecommunications services must operate under a license granted by the Communications Ministry. These licenses are only granted to a Mexican citizen or corporation and may only be transferred with the approval of the Communications Ministry. Telmex's license was granted in 1976 and amended in 1990.<sup>4</sup>

The Communications Law gives certain special rights to the Mexican government with regard to licensees. For example, the government may require up to a 50-percent discount on services provided by the licensed company to the government.<sup>5</sup> In addition, the government has the right to take over the management of the company in cases of imminent danger to national security or the national economy.

#### ***5.2.1.1 Secretariat of Communications and Transportation (SCT)***

The Secretariat of Communications and Transportation (SCT) is the regulatory agency responsible for setting telecommunications policies. As a regulatory agency the SCT has a similar role to the US Federal Communications Commission, however, given its status as a Federal Ministry, it has more functions, more responsibilities, and hence, more political trade-offs.

Organizationally, the SCT is divided into three deputy secretariats (see Figure 5.1): Infrastructure, Transport, and Communications and Technological Development. The

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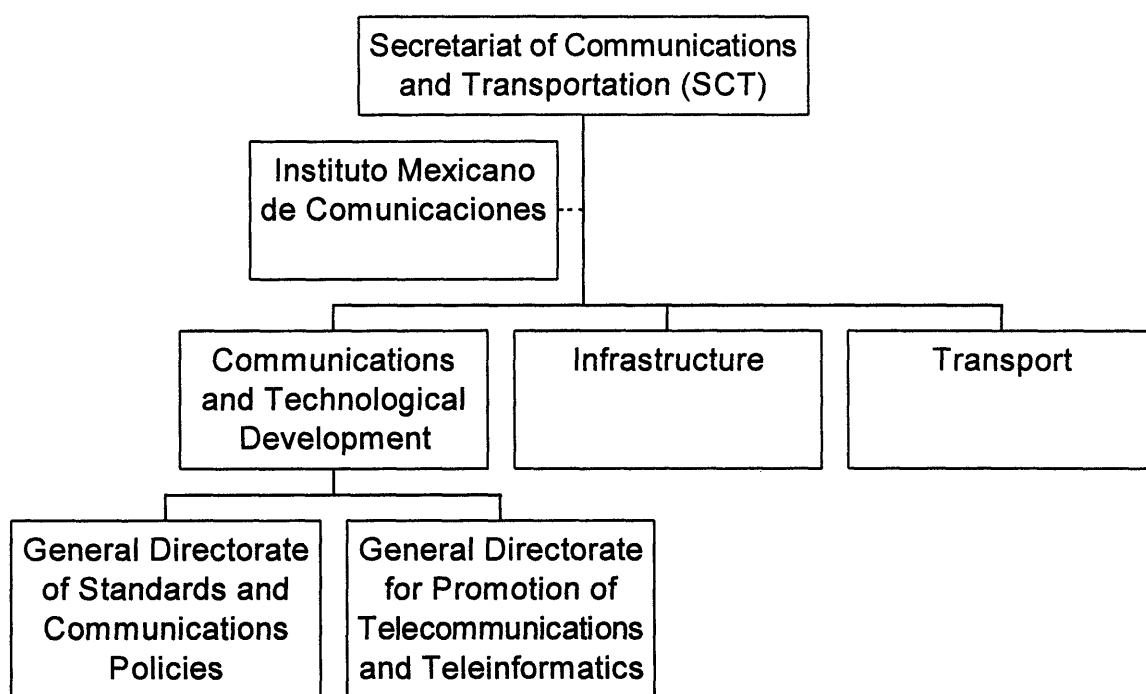
<sup>3</sup> Reglamento de Telecomunicaciones, *Diario Oficial*, October 29, 1990

<sup>4</sup> Modificaciones al Título de Concesión de Teléfonos de México, *Diario Oficial*, December 10, 1990

<sup>5</sup> Tomlinson 1995, p 115

Communications and Technological Development, or Communications Ministry, includes both the General Directorate of Standards and Communications Policies, and the General Directorate for Promotion of Telecommunications and Teleinformatics. The Instituto Mexicano de Comunicaciones (IMC) serves as a consultant on communications issues for the SCT.<sup>6</sup>

### SECRETARIAT OF COMMUNICATIONS AND TRANSPORTATION



**Figure 5.1 SCT's Organizational Structure**

Source: Latin American Telecommunications

The Communications Ministry is the government agency principally responsible for regulating telecommunications services. The ministry's approval is required for any change in the by-laws of a telecommunications company and for any issuance of debt or equity

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<sup>6</sup> Tomlinson 1995, p 116

securities to finance construction of the telecommunications network. It also has broad powers to monitor the company's compliance with the license, and it can require the company to supply it with such technical, administrative and financial information as it may require.

Telecommunications companies must submit service expansion plans to the Communications Ministry for publication and the ministry is authorized to require the company to modify certain technical plans in response to objections from other interested parties. Telephone companies must also advise the ministry on a quarterly basis of the progress of its expansion program.<sup>7</sup>

With the passage of the new investment law, in December 1993, most firms could be 100-percent foreign-owned without prior permission from the authorities. However, some restrictions remained, for example, with respect to telecommunications, television and radio broadcasting are sectors reserved for Mexicans; in cable television, foreign investors are limited to minority holding (49 percent); and in cellular phone systems, foreign investors require permission for holding of more than 49 percent.<sup>8</sup>

With regard to pricing, the regulatory mechanism adopted after divestiture is an RPI-X price cap system similar to the one used in the regulation of British Telecom. Specifically, a basket of services -- installation and rental charges, metered local calls, and domestic and international long distance calls -- is subject to price controls. The average price of this basket, using the previous year's quantities as weights, can rise at a rate no higher than RPI-

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<sup>7</sup> Tomlinson 1995, p 116

<sup>8</sup> Tomlinson 1995, p 117

X, where RPI is the retail price index and X is a factor to be set at zero until 1996, and for 1997-98 at 3 percent. Thereafter it will be reset every four years based on incremental costs. Services not included in the basket (cellular telephony, yellow pages, private circuits, etc.) are unregulated.

An innovative feature of the regulatory environment for Telmex is that, apart from the price regulation, the company also faces certain quantity constraints and competitive conditions. Under the title of concession, the company has been granted a monopoly on all fixed-link telephone services until August 1996. After that date other firms may be given permission to offer long distance services. Telmex must then provide interconnection to these other firms. Local services may remain the sole franchise of Telmex.

To preserve its monopoly, however, Telmex must meet certain network expansion targets. The function of this feature of the regulation is to ensure that the company is not content with serving its existing client base but continues to expand aggressively. The targets it must meet are the following:<sup>9</sup>

- The number of lines in service must expand at a minimum of 12 percent per year until 1994.
- All towns with populations of 500 or more must have telephone service by the end of 1994.
- The number of public telephones must be increased from 0.8 per 1,000 population to 2 per 1,000 in 1994 and 5 per 1,000 in 1998.

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<sup>9</sup> Tandon 1994, p 419

- In towns with automatic exchanges, the maximum waiting time for a new connection must be reduced to six months by 1995 and one month by 2000.

In addition, Telmex is required to meet certain standards in terms of the speed with which repairs are carried out.

Although the penalty for failure to meet these targets is termination of the concession, it is unlikely that the government would exercise that right except in extreme circumstances. Thus Telmex has an effectively secure monopoly on fixed-link local services at least until 2026 (when the concession runs out), and on long distance services until August 1996 -- at the time of this writing. Further, it is subject to a rather generous price cap on its basic telephone services, with considerable freedom to set prices within the basket.<sup>10</sup>

On early 1995, México's Federal Competition Commission, the anti-monopoly body set up by President Salinas in 1994, announced some remarkably pro-competitive rules for liberalization of the long-distance telephony market in 1997: no onerous fees, no expensive auctioning process, no limits on the number of entrants.<sup>11</sup>

With the new Federal Telecommunications Law, the Telecommunications Regulations, and the new Concession Title for Telmex, a regulatory structure needed in México for a long time, the country has set itself on a course to face the painful process of becoming a true open market.<sup>12</sup>

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<sup>10</sup> Tandon 1994, p 420

<sup>11</sup> The Economist, July 1st, 1995, p 62

<sup>12</sup> Satellite Communications, August 1995, p 19

### **5.2.2 A Legal Framework for Privatization.**

The legal foundations for the divestiture process are clearly outlined in three articles of the Constitution of the United Mexican States. Article 25 establishes the limits to private sector participation and therefore the limits of the privatization program. It states that “The public sector will be exclusively in charge of the strategic areas listed in article 28 paragraph 4 of the Constitution, with the Federal Government as the owner and authority in charge of the entities created to that effect.” These strategic activities are the minting of coins, the postal service, telegraphs, and radiotelegraphs, printing of money, oil and all hydrocarbons, the basic petrochemical industry, radioactive minerals, and the generation of nuclear power, electricity, and railways. For all other activities it is therefore not only possible but consistent with the spirit of the Constitution to seek the participation of the private sector through, among other options, privatization.<sup>13</sup>

While these first two articles refer to what can be sold, Article 134 refers to the minimum conditions that have to be satisfied in the divestiture processes. For instance, paragraph 2 states that transfer of control of a parastatal enterprise to private hands “will be adjudicated through public auctions convened by public edict, so that participants can freely present their postures in a closed envelope, which will be opened publicly, to assure that the State gets the best conditions in terms of price, opportunity and other applicable conditions.”

Other secondary laws complement the basic constitutional framework regarding divestiture operations different from sales. The Organic Law of the Federal Public Administration defines how parastatal firms can be declared bankrupt and liquidated, while

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<sup>13</sup> Aspe 1993, p 195

the Federal Law of Parastatal Entities establishes the legal procedures for mergers and transfers.

Finally, when a public sector entity was created by law or decree of Congress, congressional authorization must be sought for the entity to be divested. Also to the extent that these operations may have an impact on the budget, in compliance with the constitutional obligation of the executive branch to inform the House of Representatives on the financial state of the nation, there is also the obligation to keep it informed about the evolution of the divestiture process (Article 74).<sup>14</sup>

Appendix A contains a detailed description of the process followed to sell a parastatal firm in México.

### **5.2.3 The Sale Transaction**

Telmex was divested on 20 December 1990, through the sale of a controlling block of stock to a consortium headed by the Grupo Carso. The method of sale was a sealed-bid auction. The winning consortium is 51 percent Mexican owned, with the remaining 49 percent divided equally between Southwestern Bell Corp. and France Cable et Radio. The purchase price for 20.4 percent of the enterprise was US\$1.67 billion. In addition, the buyers were sold options to buy a further 5.1 percent, and employees were sold a 4.4 percent share. On 15 May 1991 a further 16.5 percent of the company's stock was sold for approximately US\$2.37 billion. And in May 1992 the government sold an additional 4.7 percent of the

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<sup>14</sup> Aspe 1993, p 196

enterprise for US\$1.4 billion. In all, the government has sold 51.1 percent of Telmex for a total (in May 1991 dollars) of over US\$6.2 billion.<sup>15</sup>

One interesting aspect of the sale is the capital stock restructuring carried out just prior to the sale. Before divestiture the enterprise had two classes of stock: AA shares could be owned only by the government, and A shares were unrestricted as to ownership. The government first reduced the number of AA shares (from 55.9 percent to 51 percent) by converting some into A shares. Next the enterprise declared a stock dividend of 1.5 newly created L shares for each A or AA share held. The L shares had very limited voting rights. Thus the AA and A shares (40 percent of the stock) collectively controlled the enterprise. The AA shares alone (51 percent of the voting stock, 20.4 percent of the total) were enough for control; these were the shares offered for sale in December 1990, and their sale to the Carso group was sufficient to turn over the control of Telmex to the consortium.<sup>16</sup>

### ***5.3 POLICY ALTERNATIVES AND IMPLICATIONS***

When a country begins its development process, it is possible to find strong reasons to have a widespread state presence in the economy. The lack of markets and infrastructure may present such insurmountable obstacles to private entrepreneurs that no one would be interested in producing certain types of goods -- or if they were interested, there is no guarantee that they would do it efficiently. There are basically three economic circumstances in which public ownership can be rationalized:<sup>17</sup>

- Missing markets and insufficient taxation

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<sup>15</sup> Tandon 1994, p 431

<sup>16</sup> Tandon 1994, p 432

<sup>17</sup> Aspe 1993, p 184

- Prices vs. quantities in fragmented markets
- Income distribution, natural monopolies, and market size

The empirical literature of economic development, public choice theory, and industrial organization has highlighted some important shortcomings in the operation of parastatal companies, which can very seriously hurt the economy as a whole in terms of both efficiency and social justice.<sup>18</sup> Drawing from these studies, it could be said that in spite of the theoretical arguments in favor of widespread state intervention in less developed countries, in practice the circumstances under which state firms are created and managed make the benefits less obvious.<sup>19</sup>

The formation process for a parastatal sector is not always guided by some of the criteria mentioned above. In many instances, firms are incorporated at random to the public sector in an attempt to save jobs. The result is that the government ends up with cabarets, cinemas, airlines, and hotels, without any consistent strategy. Furthermore, many of the firms rescued by the governments are not efficient to begin with, which is why they were about to go bankrupt. In most cases the new government management does not improve the situation. Firms making losses usually keep on making losses, placing an additional burden on the taxpayers and worsening the overall macroeconomic picture. In addition, the policy of rescuing inefficient firms introduces a negative incentive to private firms to respond creatively to external shocks, because they know that bankruptcy will never take place: the worst thing that can happen is that the government nationalizes the company.

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<sup>18</sup> Jones 1982, Nellis 1986, Short 1986, and Van de Walle 1989

<sup>19</sup> Aspe 1993, p 185

Covering the losses of inefficient parastatal enterprises diverts scarce resources from the natural function of a government to provide health, education, and basic infrastructure for the population. Also, in many instances the limited resources from taxpayers are used to prevent capital losses for the shareholders and the bankers of a firm instead of attending to the most pressing social needs. Finally, in the frenzy of expanding the parastatal sector, many new firms are bailed out or incorporated hastily, without a careful revision by congressional authorities, in relative secrecy and without any consideration for the distributional consequences of the decisions.<sup>20</sup>

Having said that except in the case of strategic industries, the process of modernization leaves very little room for an industrialization based on state-owned enterprises, the question remains if private firms can do better. A priori, there is no single direct answer to this question, simply because in spite of the institutional reforms that come with trade liberalization, progressive tax reforms, and better industrial regulation, there will still be circumstances in which privatization could make things worse. It is also true, however, that in some cases it is possible to have a regulatory framework within which private firms can contribute more effectively to economic welfare than can state-owned enterprises.

Therefore, the reasons for not privatizing lay primarily though not exclusively in the welfare costs of private monopolies; the reasons for privatizing have to do with the high monitoring costs and other information asymmetries between the public, politicians, and managers of state-owned firms. In the end, the decision will depend on the formation of an

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<sup>20</sup> Aspe 1993, p 186

adequate institutional framework within which private owners can assure that their managers operate the firm efficiently, and the authorities can be sure that the market works to allocate resources where their marginal benefit equals marginal cost.

Empirical studies on the comparative performance of public and private firms in countries that had gone through the privatization process before México are consistent with this line of reasoning.<sup>21</sup> For example, in a more detailed study in which market structure, regulation, and other relevant market conditions are carefully taken into account, it has been found that when market power is significant but there is room for a certain degree of competition (such as in the case of airlines, the sale and distribution of gas, long-distance telephone services, public utilities, etc.), private firms are considerably superior to public enterprises in productivity and profitability.<sup>22</sup>

However, the same studies also show that when there is market power, but also a strong tendency toward natural monopoly, no unequivocal evidence supports one type of ownership over another, and that the final decision on whether to privatize depends on the particular characteristics of each enterprise and industry. In fact, in spite of the advantages that one may find in principle from transferring enterprises to the private sector, the risks of making mistakes can offset all potential benefits. Therefore, as the sale takes place, one has to make sure that the newly transferred firms operate in a regulatory framework that is propitious to the efficient management of its resources and favorable to competition.<sup>23</sup>

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<sup>21</sup> Pryke 1982, Forsyth 1984, Vickers and Yarrow 1988

<sup>22</sup> Aspe 1993, p 187

<sup>23</sup> Aspe 1993, p 188

### **5.3.1 Microeconomic Considerations for a Privatization Program.**

The process of privatization does not begin and end with the sale of a public entity. Attention must also be paid to the economic principles involved in the way in which the sale is made and how the enterprise will operate under private ownership. In general, there are two main microeconomic considerations. First, the sale scheme must allow new private owners to control the firm's management effectively. Second, whenever possible, the firm must operate in a competitive environment, and if that is not possible, there must be an appropriate regulatory scheme to ensure internal and allocative efficiency.<sup>24</sup>

The design of the sale strategy can have a significant impact on market structure. Many of the regulatory problems that emerge with the transfer of public sector monopolies to the private sector can be solved in the design phase of the privatization scheme. A good example of this is the option of franchising (competition for monopoly), where private operators may have the opportunity to outbid and displace public suppliers, especially in cases in which the product or service has simple specifications. Another example would be the decision to partition a public sector monopoly and sell its parts, versus the alternative of selling the monopoly as is and then proceeding to regulate, as typified by the telecommunications sectors, where it is possible to separate local telephone services from long-distance services.<sup>25</sup>

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<sup>24</sup> Aspe 1993, p 189

<sup>25</sup> Aspe 1993, p 192

### **5.3.2 Macroeconomic Effects**

Tandon believes that the sale of Telmex might have had a strong impact on the subsequent economic recovery.<sup>26</sup> His argument is as follows. First, a key ingredient of México's macroeconomic stabilization has been to stem and even reverse the massive capital outflows in the form of external debt service and capital flight. This was the basic premise for the debt rescheduling agreement: that the capital drain was making investment in the economy impossible. Second, Telmex has been a source of very large capital inflows, over US\$6 billion in a period of a year and a half. By comparison, the debt rescheduling reduced México's interest payments by US\$1.3 billion a year and reduced total capital outflows (interest plus principal) by US\$4 billion a year. Thus the sale of Telmex had the same direct fiscal impact on the government in the same time period as did the debt rescheduling. Third, it can be argued that Telmex was a catalyst for the highly successful divestitures that followed (e.g. banks).<sup>27</sup>

## ***5.4 ROLE OF STAKEHOLDERS***

### **5.4.1 Changes in Prices and Taxation**

In the 1981-87 period, the slow decline in real prices partially masks the fact that the prices received by Telmex were declining somewhat faster, because the tax rates on services were rising slightly. This might have happened because there was a regulatory lag, and inflation was accelerating. However, there is also evidence that suggests that low prices were a reflection of government social policy.<sup>28</sup>

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<sup>26</sup> Tandon 1994, p 432

<sup>27</sup> Tandon 1994, p 435

<sup>28</sup> Tandon 1994, p 437

During the 1981-87 period tax rates were adjusted in a way that stabilized the returns to the government. The government obtained its return from the enterprise in the form of indirect taxes, and consumers were kept happy with low prices; the losers were the private shareholders, who received next to no return. Thus, although Telmex remained profitable, it was unable to generate sufficient funds for investment. Both the low level of capital formation and the low stock price of the enterprise throughout this period are thereby explained.<sup>29</sup>

In 1988, however, most prices were raised significantly. This price increase was induced by the rapid inflation of the previous two years and the need for investment capital. This is also suggested by the fact that the biggest price increases were for services with the lowest demand elasticities: connection charges, rentals, and metered service.

The pricing and tax regime was drastically reformed in January 1990. The key change was the elimination of the telephone tax, leaving only the 15 percent value added tax, which the enterprise was permitted to absorb partially or wholly into its price. This was true for rentals, metered local calls, and domestic long-distance calls. The nominal price of international calls fell. Thus the price reform moved prices more in line with international prices.<sup>30</sup>

These reforms provided a substantial boost to Telmex by essentially transferring to it a large proportion of what the government had previously derived from the enterprise. These

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<sup>29</sup> Tandon 1994, p 437

<sup>30</sup> Tandon 1994, p 440

reforms occurred after the intention to sell Telmex had been announced, thus they might have been very much a part of the divestiture process.<sup>31</sup>

The 1990 price reform was a major departure from past practice and an attempt to modernize the telecommunications sector by bringing prices more in line with the costs of providing different types of services. Divestiture was another out-of-the-ordinary step to transform the sector. The net effect of the price reform, as calculated by Tandon, was a rise in social welfare of Mex\$17 trillion of 1991 pesos, then he concludes that this was a welfare-improving reform. However, he also recognizes that the summary figure masks a very large distributive effect of the reform, as it cost consumers Mex\$92 trillion in present value while raising the value of the firm by Mex\$96 trillion.<sup>32</sup>

#### **5.4.2 Negative Effects of Telmex Privatization**

If there is one negative with regard to the Telmex sale, it is that, because such a high proportion of the ownership is foreign, a large fraction of the total benefits have leaked abroad. Tandon estimated that foreign shareholders have gained Mex\$67 trillion, or nearly 90 percent of the total welfare gain of Mex\$75 trillion.<sup>33</sup>

Another effect that should have been avoided relates with the government's policy of selling enterprises to well-identified buyers rather than to a diffuse set of buyers in the stock market. Frequently a particular individual can be identified as "the buyer." Thus it may be said, even though the shares were actually bought by consortia, that Carlos Slim bought Telmex or that Roberto Hernández bought Banamex. Whereas this type of sale might be

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<sup>31</sup> Tandon 1994, p 441

<sup>32</sup> Tandon 1994, p 452

<sup>33</sup> Tandon 1994, p 453

thought as desirable because it gives the buyers greater freedom of action (and hence might raise their willingness to pay), it potentially reduces the ability of the capital market to police the divested enterprise as the threat of takeover disappears.<sup>34</sup>

Customer service also remains a problem. The number of complaints about Telmex to the Mexican Consumer Protection Agency (Profeco) reached an all-time high in the post-privatization years. This is a result of both the inadequacy of the network and of higher expectations by the public. In response to the growing dissatisfaction and pressure from the telecommunications regulatory body, Telmex established offices in major cities where phone subscribers could lodge complaints. Despite the increased complaints, Telmex's record shows that the company continued to modernize and expand its network.

### ***5.5 NEXT REGULATORY ACTIONS***

Regarding the government's decision on the interconnection rates which Telmex will charge its future competitors in the long-distance market, it was reported that the potential new entrants into the market wanted to pay the equivalent of no more than \$0.015 per minute, while Telmex itself argued that it needed to charge \$0.14 to cover its costs. In the end the Ministry of Communications and Transport fixed the average rate per minute at \$0.0532 for 1997 and \$0.0469 for 1998. Although neither Telmex nor investors were impressed by the ministry's decision, it was very much in line with analysts' expectations as a figure which would neither prejudice nor unduly protect the former state monopoly.<sup>35</sup>

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<sup>34</sup> Tandon 1994, p 522

<sup>35</sup> The Economist Intelligence Unit, 2nd Quarter 1996, p 20

Local service technically has been open to competition. However, Telmex's own service has been operating in the red, subsidized by high long-distance charges, thereby discouraging any would-be competitors.

Although the new carriers are targeting the long-distance market, both Alestra and Iusatel, among others, have expressed interest in local telephony. SCT Secretary Carlos Ruiz Sacristán has reportedly said the ministry will grant two concessions for local service.

As the telephone market evolves, the new carriers and Telmex are expected to introduce other telecommunications technologies to México.

They may include fixed wireless transmission, or fixed cellular, by which a user has a cellular phone but can operate it in a very limited area (such as within a home).

For now carriers have been concentrating on installing fiber-optic cable networks which industry executives say offer the best sound and capacity for the price. In addition, in its bid to promote the development of the country's telecommunications infrastructure, the SCT elected not to charge concession fees to those companies that installed cable-based networks.

But this year, the SCT is planning to begin auctioning off long-term operating concessions for satellites and the radio-electric spectrums. The process is expected to accelerate communications development in such areas as direct-to-home television, two-way paging services and non-cellular applications of mobile telephones.<sup>36</sup>

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<sup>36</sup> Business México, July 1996, p 17

## **5.6 CONCLUSION**

The modification of laws and regulations has played a decisive role in the effort to modernize the Mexican telecommunications sector. Without those changes, little would have been accomplished. They have set the basis not only for Telmex's privatization, but for the ongoing liberalization of this market. Something even harder to perform.

A clear and well defined process was followed during Telmex's privatization,<sup>37</sup> with enough checks and balances to minimize the risk of unfairness or corruption. It not only comply with the legal requirements, but it is supported by economic and public policy arguments. It was a strategic decision that should report sustained long-term benefits.

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<sup>37</sup> The same process is used for selling any state-owned enterprise in México.

## **6. FRAMEWORK FOR A POLICY ANALYSIS ON TELECOMMUNICATIONS IN MÉXICO.**

### ***6.1 INTRODUCTION***

Most analysts writing about the successful privatization of Telmex agree that this project was managed efficiently and without major disruptions. Petrazzini argues that it was mainly due to the strong political control held by the presidency and the favorable economic conditions that surrounded the process.<sup>1</sup> Even those who criticize this privatization, recognize that it has positive elements and qualify the process, in general, as beneficial for the sector.

However, those who consider this process as highly successful use as an argument the economic benefits that it represented for the government and the macroeconomic environment in the country. They do not emphasize the impact that it has had on the quality of service, or on the prices for the end customer.

On the other hand, those who criticize the Telmex privatization talk about the close relation between Carlos Slim, Grupo Carso's head, and the government, about presumed corruption and illegal practices during this sale, about the exploitation that Telmex is making of the consumers, about the terrible service, etc. Such critics may not be well-informed and generally have some political orientation, which makes them underline any negative effect that a government action may have. Sometimes, isolated examples are amplified in such a way that they might be thought as a general trend. These critics, who typically may have one or more telephones at home, cellular phone and maybe some other communication device, do not speak usually about universal service, or how the rational use of these technologies may

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<sup>1</sup> Petrazzini 1995, p 126

promote the educational and economic development in México, or how the subsidies that Telmex offered in the past were not a sustainable strategy for the advancement of telecommunications in México.

Criticism can be helpful, but no action that the government performs should be criticized superficially. Government functions are complex due to the fact that any decision will affect in some way each social group. To criticize a government action we should know all its implications, and understand how it will affect each stakeholder. Then we may criticize, but always in a positive way, always with a proposal for improving things, taking into account not only my group's interests, but those of all the stakeholders.

If the Telmex privatization is regarded as successful and as an example from which other countries may obtain valuable lessons it is because it has or will have brought benefits. There is consensus that those benefits do exist. However, as Hills challenges,<sup>2</sup> normally it has not been asked who are the receivers of those benefits, or how are they distributed among the stakeholders.

To do an analysis about telecommunications policy we should review what are those benefits, or costs, for each group, then identify opportunities or issues that have not been covered with the current policy, and last, present a proposal of how such policy can be strengthened.

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<sup>2</sup> Hills 1986, p 1

## **6.2 BENEFITS**

### **6.2.1 Government**

The Telmex sale represented to the government an income of over US\$6.2 billion.<sup>3</sup> This is a considerable amount, especially when compared with the annual savings of the external debt renegotiation -- approximately US\$4 billion. As some authors pointed out, this income on an annual basis, was at least equal to the benefit obtained through the renegotiation of the external debt with foreign banks.<sup>4</sup>

If the government had stayed in charge of Telmex, it would have had to invest a huge amount of money. The company's revenues would not have been enough, especially after several years in which the amount of investments were kept relatively low. Modernizing the sector with the sole participation of the government would have been unfeasible.

Telmex's sale also improved the government's reputation. It gave credibility to its economic policy aimed to reduce fiscal deficit, divest parastatals, control inflation, etc. It promoted also that the selling of other public enterprises, e.g. banks, were made under more favorable conditions for the government. It worked, as well, as a strong signal for the international community about the government's commitment to its new economic strategy.

### **6.2.2 Telmex's employees**

With the Telmex sale, fear existed of massive layoffs. It did not happen even though the productivity was low and decreasing.<sup>5</sup> Due to the fact that the unsatisfied demand was

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<sup>3</sup> Tandon 1994, p 431

<sup>4</sup> Tandon 1994, p 435

<sup>5</sup> Tandon 1994, p 428

large and increasing, a moderate effort to try to catch up with the demand was enough to avoid layoffs and increase productivity.

Telmex's employees not only gained security on his job, they also obtained a share of the company's stock (4.4%) through low interest loans. In addition to the economic benefits that this represents, it creates in them more awareness about how their work enlarges their patrimony.

### **6.2.3 Grupo Carso**

It may be redundant to say that buying Telmex was beneficial for Grupo Carso. Otherwise they would not have participated in this auction. They paid for it a reasonable price, and obtained an enterprise with high revenues in a sector with enormous potential.

The conditions that were negotiated in its purchase, e.g. moderate price regulation, a closed long-distance market until 1997, purchase of the Telecomm microwave network, etc., represented a very attractive package.

It is true that the enterprise would require an aggressive investment plan for the short run, however, the conditions existed for that investment to report high returns.

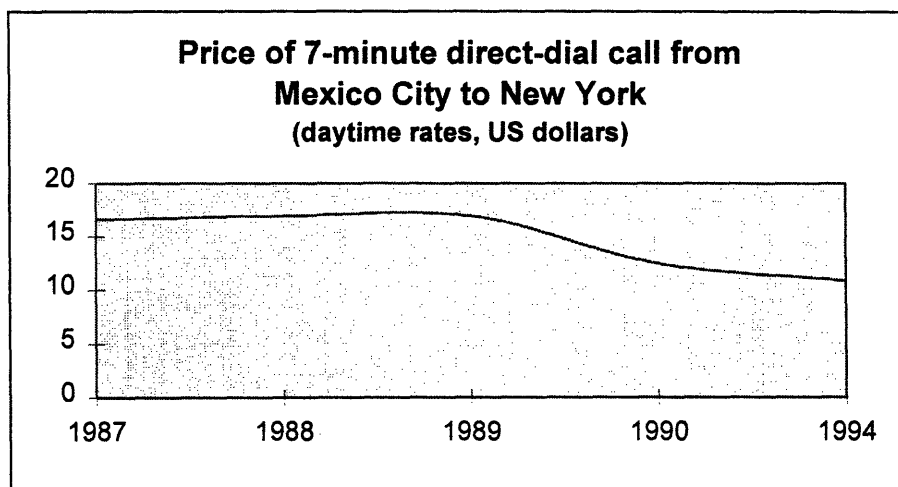
### **6.2.4 Equipment providers**

With the new regulation on telecommunication equipment that resulted from NAFTA, the Mexican market is more accessible now for North American suppliers than for those from other countries.

Nevertheless, due to growth caused by the liberalization of this market in México, many suppliers may increase their revenues in the long run.

### 6.2.5 Customers

The benefits obtained by customers since Telmex privatization are hard to recognize because they have come together with price increases. The opponents of privatization argue that prices are still too high and service is very deficient.



**Figure 6.1 Trend in Long-distance Pricing**

Source: Telmex

Both statements are incorrect. Long distance prices have shown a downward trend even before the opening of this market (as shown in Fig. 6.1). In spite of the cross-subsidization decrease, basic service rates have not been impacted substantially. Such service in México costs less than US\$10 (July '96). NYNEX charges for an equivalent service US\$16 approximately.

Regarding the quality of service, any user in México will agree that it has improved substantially during the last few years. Not only has repair time decreased, but the attention to failures is better and its likelihood of recurring is lower.

Less than four years ago, when requesting a residential line in a recently urbanized sector in a city, e.g. Monterrey, it was common to obtain as a response that no lines were available. It was not possible even to get an estimate of when the service might be available. Today, in a similar scenario, availability schedule is generally defined and the installation of a new line does not take, on average, more than a few months.

As a result of the growing number of digital central offices, the amount of services that Telmex offers as options to the basic service has burgeoned: call waiting, message center, call routing and identification, etc.

It is true that all these benefits have not been free for the user. Customers were used to pay less for a bad service. Now they will have to recognize that paying a little more is worthwhile for a good service.

Tandon tried to estimate the cost for customers during the 10 years following privatization, since 1991.<sup>6</sup> The results from this study showed a figure of Mex\$92 trillion of 1991 pesos.<sup>7</sup> This quantity should be taken with much reserve. To estimate with a fair amount of accuracy how prices could behave in a relatively stable environment, as the one which Telmex was in before privatization, is extremely difficult. Then, it is obvious how likely this result may change because of a highly competitive market, as this will be in the following years.

Moreover, Tandon recognizes that prices before privatization did not reflect the real costs of the services provided by Telmex. And that the net effect of this reform was a social

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<sup>6</sup> Tandon 1994, p 452

<sup>7</sup> 1000 pesos of 1991=1 new peso since January 1st, 1993.

welfare gain of Mex\$17 trillion of 1991 pesos.<sup>8</sup> Subsidy elimination is evident in the deadweight loss for customers.

### **6.3 OPPORTUNITY AREAS**

#### **6.3.1 Liberalization of local services**

As was mentioned before, Telmex has a license for local telephone service until 2026, but the SCT could allow other companies to compete in that market.<sup>9</sup> For example, Iusacell has the authorization for using part of the radiofrequency spectrum, and it has also requested the license to provide wireless local telephony service (WLTS) using this spectrum, however the SCT has not decided on this issue.

Telefónica Inalámbrica del Norte, a recently formed company in northern México, has been awarded, three months ago, the license to give local telephony service. On the other hand, it does not have access yet to any band of the radiofrequency spectrum, mainly due to the fact that SCT has not defined a mechanism to assign or auction it.

In other countries, such as the United States after the Telecommunications Act of 1996, the local service has been liberalized. The opportunity to foster that sector in México with a similar action may exist and should be analyzed.

#### **6.3.2 Universal Service**

In the United States, the universal service philosophy on telephony has existed for a long time. These days, the concept has been strongly questioned due to its implications with newer technologies, as in the case of Internet Telephony. Even in a country with a highly

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<sup>8</sup> Tandon 1994, p 441

<sup>9</sup> Modificaciones al Título de Concesión de Teléfonos de México, *Diario Oficial*, Dec. 10, 1990

developed telephony system, as the United States, much discussion exists about the haves and have nots of telecommunications services.

The question here is why in México, a country with profound social and technological inequalities among its population, the concept of universal service does not seem to raise much awareness. Why with the government disposition on Telmex to provide with basic telephony service to all towns with more than 500 inhabitants, the issue looks like being solved? It is obvious that the issue of universal service is not solved yet, much work remains to be done. The conditions exist to make significant progress in this area.

### **6.3.3 Impartial entity for regulation and strategy**

The Federal Government through the Secretariat of Communications and Transportation has been in charge of regulating the telecommunications sector in México. However, the government has played in many occasions, the role of jury and prosecutor. As an example it can be said that the government still owns a 4.8% of Telmex's stock. Although this participation does not enable it to take decisions for the company, any change in the regulation may bring economic effects for the government.

Moreover, the actions followed by the SCT require some explanation. Universal service is a good example of an area in which more debate and definition should be beneficial.

A possible cause of this lack of definition might be the number of people involved in addressing such issues. It has been said that México has few telecommunications experts responsible for advising and helping the Communications Ministry to define strategies.

#### **6.3.4 Implementation of new technologies.**

With the participation in the Mexican telecommunications market of foreign companies, with the newest technology, we may easily think that the technological development of this sector is guaranteed and will be achieved without troubles.

Having advanced technology has never guaranteed a successful implementation. Although it is a decisive, or maybe necessary condition, it is seldom enough.

We should add to this that developed countries sometimes create barriers for the use of certain technologies by foreign countries. In these cases they decide which technologies may be exported and which ones may not. For example, some years ago, it was common that computers commercialized in México and other developing countries were not the newest models available at the same time in developed countries. A current example is encryption software, whose sale is prohibited outside the United States.

The use of new technologies represents an important opportunity especially for the potential leap-frogging toward improved solutions that it encompass. But at the same time, this technologies possess risks that should be known and managed adequately.

#### **6.3.5 Revenues leaking abroad**

The government consciously opened the market to foreign competition in order to attract capital and technologies not available in México. Consequently, it should be expected that the market will grow and report considerable income. Although the participation of foreign enterprises in the new joint-ventures does not represent most of the stock, it accounts for an important percentage of it. This will constitute a big amount of resources that may not stay in the country.

Additionally, foreign enterprise's partners in these projects are Mexican banks. Their banking business is going through a difficult time, thus adding some uncertainty for the near future.

#### **6.4 RECOMMENDATIONS**

As I mentioned at the beginning, once the benefits obtained by each group and the opportunities that still exist are reviewed, it is necessary to present alternatives aimed to improve the current situation. My proposal consists of the following points:

##### ***Perform a comprehensive analysis of the impact of liberalizing local service.***

Enough empirical evidence exists to believe that such research will indicate that the market should be liberalized in a relatively short timeframe, and definitely to not wait until year 2026. But the impacts of that policy should be estimated in order to establish the appropriate mechanisms to implement it.

Opening the local service to competition will undoubtedly bring a large impulse to wireless communications. This will have effects on the allocation and use of the available spectrum. Theory also predicts that local rates will tend to decrease, and this will benefit residential as well as business users.

If measures are not taken, an undesirable consequence of liberalizing local service would be that competition may become highly concentrated on the big cities where demand would be guaranteed, relegating again rural areas to underdevelopment. Provisions should be taken to benefit also, and maybe to a greater extent, rural areas, where wireless local telephone services (WLTS) maybe practically the only alternative and a more efficient one.

***Develop precise objectives for universal service in México.***

As a consequence of the previous recommendation, it is obvious the need to define in concrete terms universal service parameters. Companies competing in the local services market will need it as a framework for its operation.

***Establish an independent body for regulating and defining strategies for telecommunications sector development.***

Such a body must have enough experts in areas such as technology, economics, urban planning, etc. At the same time this group should be small enough to avoid bureaucracy and disorganization.

Being an independent body does not mean necessarily that it has to be outside of the government. The Department of Disincorporation of Parastatal Entities is an example of an independent team working inside the government. Petrazzini and others explain how this group did a highly efficient job regarding Telmex's privatization.<sup>10</sup> They worked for the Finance Ministry and consisted of a few highly educated people, committed to their task, and completely removed from political responsibilities.

Maybe this should be the new role for the Communications Ministry. If this is the case, it will require a profound transformation.

An institutional framework must exist for this entity to regulate free from politics in a fair and competitive market policy. A mechanism that enables the participation of all the groups involved in any decision or regulation should exist as well. The model followed by the FCC in the USA might be a good starting point for such a mechanism. This model

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<sup>10</sup> Petrazzini 1995, p 113

encourages the general public to participate in the development of new regulation. All this feedback is analyzed before a final decision is made by the FCC.

***Technology transfer and adequate planning should be emphasized in order to achieve effective implementation of new technologies.***

With a trained body to define strategies, and with clearly defined objectives for telecommunications development in México, distortions that may arise from the free interaction of market forces will be avoided.

This would enable also that technologies available in México from foreign suppliers satisfy effectively Mexican needs. This would allow Mexican stakeholders to decide which technologies are better suited for the development of this sector, and hence, the national economy. Although sometimes forgotten, this is the spirit for the rule of keeping control by a Mexican group in the new joint ventures (e.g. Avantel, Alestra, etc.).

## **6.5 CONCLUSION**

In view of the increasing importance of the transfer of information to economic and social development, the rapid building-up of the telecommunication infrastructure posed a considerable challenge for México. This is one reason why the country acted to reform its telecommunication market: separating operations from regulation, privatizing the telecommunication operator and liberalizing its market.

The telecommunications sector in México has experienced a dramatic change during the last few years. Now, after Telmex's successful privatization and subsequent profound market liberalization, it is considered among the most open in the world. México has the opportunity to be a pace-setter in using competition to bridge the gap with other countries.

A new regulatory structure and government attitude toward telecommunications in México is enabling an accelerated development of this sector. There is still much to be done, but the basis for sustainable growth of the Mexican telecommunications infrastructure is in place.



## **APPENDIX A**

All parastatal firms sold go through a process of twelve steps. This procedure can be briefly described as follows:

Step 1. The ministry responsible for the firm to be divested (legally referred to as the sectorial coordinator) presents a divestiture proposal to an interministerial commission formed by the heads of the Ministry of Finance, the general comptroller of the United Mexican States, the Ministry of Commerce and Industrial Promotion, the Ministry of Labor, and the Central Bank (Spanish acronym: CIGF). This proposal must explicitly establish that the firm is neither strategic nor classified as “high priority” in the Constitution.

Step 2. The CIGF considering the general situation of the entity, its area of activity and its operational history, decides on the most satisfactory divestiture alternative. This could be liquidation, closing, merging, transfer, or sale.

Step 3. If it has been decided that the best option is to sell the enterprise, in accordance with the law, the firm is placed under the sole responsibility of the Ministry of Finance, which is authorized to carry out the sales process.<sup>1</sup>

Step 4. The Ministry of Finance chooses one of the commercial banks in the country as sales agent. This decision is made considering the bank’s experience and work load. The Office of Privatization at the Ministry of Finance studies the situation of each firm, and in close collaboration with its agent, designs the sale strategy.

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<sup>1</sup> Aspe 1993, p 197

Step 5. The agent presents concrete guidelines on notifications to the public, rules for the sale, timetables for visits, delivery of prospects and business profiles, size of the deposits, etc.

Step 6. The agent prepares two documents: the *profile*, which is a general overview of the enterprise, and simultaneously publishes in all major newspapers a public notice announcing that the firm is for sale and that preliminary information is available. The second document is a *descriptive prospectus* that contains detailed information on financial, commercial, technical, and labor issues.

In most cases, to be eligible to receive a prospectus, a deposit is required. In addition, interested buyers can make as many technical visits as they consider necessary, and all questions will be answered in writing and shared with the other bidders.<sup>2</sup>

Step 7. On the basis of all available information, the agent completes a technical and financial appraisal to determine a minimum reference price. In most cases this appraisal is made by Mexican financial experts, but sometimes there is additional support from international advisers.

Step 8. On a specified date all offers are received in sealed envelopes. This event takes place openly before a notary public and in the presence of representatives of the ministry of finance and the general comptroller. Immediately afterward, the agent proceeds to make the offers comparable. For example, the agent not only looks at the price in the offer,

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<sup>2</sup> Aspe 1993, p 198

but also considers the plans that the potential owner has with respect to the future of the firm, even though the price is still the dominant criterion.<sup>3</sup>

Having done this, the agent prepares a recommendation to the Ministry of Finance on the proposal that represents the best alternative. If all offers are below the reference price, or if there is only one offer, the CIGF may decide to assign the firm to one of the participants or to start the sale process over again. In most cases, there are no more than three auction rounds. If the sale cannot still be made, the CIGF proceeds to negotiate directly with the participants under the supervision of the general comptroller.

Step 9. When the CIGF gives a favorable resolution for the sale of the company, the Ministry of Finance releases an official authorization for the sale in favor of the participant who presented the best proposal.

Step 10. The deal is closed with the signing of a contract and payment is made to the treasury.

Step 11. The Ministry of Finance sends a notification and a copy of the sales contract to the Ministry of Planning and Budget to comply with all legal formalities to officially declare the enterprise out of the parastatal sector.

Step 12. When the sales process has concluded, the agent prepares the so-called white book, which includes all documents relevant to each stage in the privatization process. Copies are sent to the Ministry of Finance, the General Comptroller, and to the accounting

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<sup>3</sup> Aspe 1993, p 199

commission at the House of Representatives, which can make all the observations and studies it may deem necessary.<sup>4</sup>

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<sup>4</sup> Aspe 1993, p 200

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