

# Mexico: Information Technologies and Economic Development: Telecommunication Services and Poverty

Cristina Casanueva-Reguart and \*  
Universidad Iberoamericana, Ciudad de México

Antonio Pita S.\*  
Instituto Tecnológico y de Estudios Superiores de Monterrey

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## I. Introduction

Telecommunications services infrastructure is an important factor for economic development, social inclusion and leads to a greater equality, when services are available and affordable for any person, regardless of income and location. In the transition to a knowledge economy, the access to telecommunication services in the most impoverished regions becomes crucial.

The research summarized in this paper analyzes the design and implementation of telecommunication services policies, targeted to the poorest regions of Mexico (1990-2006). Specifically it defines universal access and service policies and their economic and social rationale. Secondly, the paper discusses the scope of social public policies designed by Mexican authorities, namely:

- The surveillance by the regulatory authorities on the compliance by the telecommunications incumbent, Teléfonos de México (Telmex), on the fulfillment of its social obligations as dominant operator, after privatization (1990-today),
- The government policy aimed at providing access to communities with less than 500 inhabitants, the public subsidized access to Internet, through public “telecentres.” These last two policies were deployed by private operators mainly the incumbent. The participation of the operators was based on a bidding process organized by the government, which resulted in an additional profitable business for the incumbent, with limited results as far the access to these services is concerned by the poor.

Finally the paper analyzes the distributive effects of these set of policies among the poorest sectors of the population.

The sources of information on which this research was based were two national surveys: the *Household Income and Expenditure Survey*, and the *Household Survey of the Access and use of Information Technologies*. Additional information on regional development reported in this paper, was based on the “Poverty Indexes” by the *National Population Council* and economic and education information by Mexico’s Census Bureau. Additionally it was used the *Annual Reports* prepared by the Secretary of Transport and Communications.

## II. Access to Telecommunication Services as a Fundamental Right, Definitions of universal access and universal service: its economic and social rationale.

The recent literature on the universal of telecommunication services has as fundamental principle that every citizen has the right to access telecommunications services, with high standard of quality. The literature on this subject distinguishes between **Universal Access** and **Universal Service**.

**Universal Access** is when everyone can access the service somewhere, at a public place, thus also called public, community or shared access. In general there would be at least one point of access per settlement over a certain population size.

**Universal Service** describes when every individual or household can have service, using it privately, either at home or increasingly carried with the individual through wireless devices.<sup>1</sup>

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\* [cristina.casanueva@uia.mx](mailto:cristina.casanueva@uia.mx), [ccasanueva@stanfordalumni.org](mailto:ccasanueva@stanfordalumni.org),

\*\* [antonio.pita@itesm.mx](mailto:antonio.pita@itesm.mx)

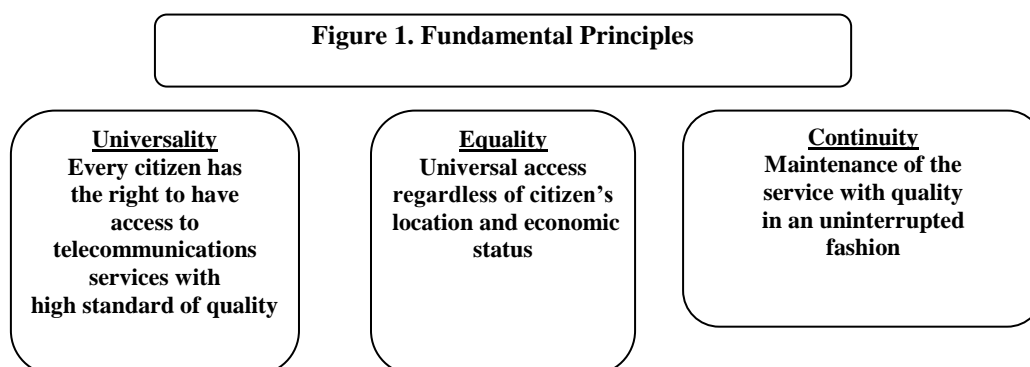
<sup>1</sup>International Telecommunication Union (2008). “Universal access and service.” *Module 4. ICT Regulation Toolkit*, Section 1.1.2. <http://www.ictregulationtoolkit.org/en/Sections.html>.

The three distinguishing characteristics of universal access and universal service are:

- **Availability:** the service is available to inhabited parts of the country through public, community, shared or personal devices;
- **Accessibility:** all citizens can use the service, regardless of location, gender, disabilities and other personal characteristics; and
- **Affordability:** the service is affordable to all citizens (see figure 1).

The policy of a **universal telecommunications service** consists of an explicit, direct and focused public policy, aimed at offering telecommunications services at affordable prices, for the poor population. The fulfillment of this policy requires a subsidy, since this sector of the population can not afford these services at market prices. The Subsidy may be applied on the **supply** or on the **demand** side of these services. On the Supply Side through the development and / or optimization of the infrastructure (investment) allowing connectivity, due to the level of geographical dispersion of these communities and the difficulty to provide infrastructure, and the cost of providing the service. On the demand side, the affordability of the provision of these services, because the people that have the need for these services generally live under conditions of poverty or extreme poverty, and their income does not allow them to have access to these services at the market price.

According to the Population Census of 2005,<sup>2</sup> there were in Mexico 184,748 rural communities with a population below 2,500 inhabitants, and 197,479 communities below 5,000 inhabitants. These communities are inhabited by over 30 million men and women, which represented 29.1 % of the Mexican population. In addition, these communities were characterized by a high level of dispersion, since 92.5 per cent of these communities had less than 500 inhabitants.



The rationale for a universal access or universal service policy is both economic and social. The economic rationale refers to the impossibility of the market to provide infrastructure, connectivity and services in a universal fashion. In effect, universal access and service policies are justified facing market failures, in order to guarantee equality economic opportunities, since telecommunication services are critical input for every process of goods and services provision and for social inclusion.

The social rationale, resides in the will of the public policy makers, representing the state and citizens, to guarantee social inclusion, avoiding exclusion of the population based on their income, as well as the location where they work and live, when the supply of these services is not profitable for the services operators, therefore the provision of the services depends on different forms of subsidy (UIT, 2006).<sup>3</sup>

<sup>2</sup> The latest available.

<sup>3</sup> UIT (2006) Informe sobre las soluciones innovadoras en materia de gestión y financiación de las políticas de servicio y acceso universales. Ginebra: UIT-D, Comisión de Estudio 1, 3er Periodo de Estudios (2002-2006).

<http://www.itu.int/opb/publications.aspx?lang=es&parent=D-STG SG01.07.1&folder=D-STG-SG01.07.1-2006>.

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### III. Public Policies on Universal Service in Mexico under the responsibility of the telecommunications regulatory agencies<sup>4</sup>

A set of policies were designed and implemented, in order to increase the social coverage of telecommunication services, they represented the main public policies implemented to provide access and universal service in Mexico, among them, and the most important were:

- The surveillance on the compliance of “Teléfonos de México” (Telmex) obligations to supply universal service, as comprised in Telmex’s license of 1990, granted by the regulator: the Under Secretary of Communications, which has the authority to monitor the compliance of Telmex’s obligations on universal service, rural telephony and of the modernization, and expansion of the public switched network, contained in Telmex’s license.
- An additional policy consisted on the direct intervention of Under Secretary of Communications (the Regulator), at increasing the coverage of rural telephony, initially was aimed to provide communication services to communities with 500 inhabitants or less. With the creation of the “Fund for Social Coverage” (FONCOS: 2002-2007).<sup>5</sup> The goal has been to communicate rural communities with a population size between 400 to 5,000 inhabitants. For this purpose the Regulator, have organized public auctions, engaging telecommunication operators. The bases for these auctions have included the provision of non-returnable monetary resources which were originally allocated by the Mexican Treasury. In addition to the monetary assets, the regulator allocated radio spectrum resources, reserved for social services coverage, granted to the winners of the public auction process. The goals of these Programs have been:
  - To increase rural telephony (1980-2002): aimed at offering services to communities with less than 500 inhabitants, and,
  - Social Coverage Fund (“Fondo de Cobertura Social” or “FONCOS”), aimed at financing the provision of telecommunication services to communities with a population between 400 to 5,000 inhabitants, and,
  - The installation of Digital Community Centres (Tele-centres) in co-responsibility with government services: education, adult education, public libraries, health, e-Government, among the most important. The infrastructure for the Centers is procured also as a result of public biddings. The Digital Community Centers are operated locally; and the content is provided by government agencies in charge of the different public programs to which the Center is dedicated to.

In the following sections describe in a more detailed form the evolution of this set of policies:

#### 1. The *Statement and Compliance* of “Teléfonos de México’s” (Telmex) obligation to supply universal service:

In the analysis of the compliance by Telmex’s in those conditions related to universal service or universal access, we contrast the statement as written in their license, with their actual compliance:

The *statement* of “Universal Service Obligations” in Telmex’s Licence establishes that: “Everyone is entitled to have access to telecommunication services, regardless of their income level, location of their homes and workplaces, either by a public booth or by a home line.”<sup>6</sup>

The *compliance*: In the same document in the following paragraph the license established that these conditions only apply to communities with more than 500 inhabitants, releasing Telmex from serving 170,929 communities and leaving unattended 92.5 per cent of the rural communities, in spite of the fact that Telmex was the only operator that had the infrastructure to reach these communities.

The *compliance*: the license allowed Telmex allowed Telmex to serve rural communities, either by a public telephone booth or by a household fixed line connection. The ambiguity of this statement, left Telmex with the alternative of only attending these communities with a public telephone booth, much less expensive for this operator, which in strict sense is not a substitute to a household fixed line connection, given that the public

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<sup>4</sup> There are two regulatory agencies directly involved with telecommunications, the Under-Secretary of Communications, which is part of the Secretary of Communications and Transports. The second regulatory agency is the Federal Commission of Telecommunications, an autonomous government agency. In the case of Universal Service and Universal access, the agency in charge of designing these policies is mainly Under-Secretary of Communications, which is also in charge of the surveillance and the monitoring of its implementation, when other agencies, both public and private are involved. In this paper we will refer to the Under-Secretary of Communications as the regulator.

<sup>5</sup> “FONCOS” for its acronym in Spanish “Fondo de Cobertura Social.”

<sup>6</sup> Condition 3-1 in “*Modificación de su Título de Concesión de Teléfonos de México*” in: [http://www.cft.gob.mx/work/sites/Cofotel\\_2008/resources/LocalContent/3964/1/10ago90.pdf](http://www.cft.gob.mx/work/sites/Cofotel_2008/resources/LocalContent/3964/1/10ago90.pdf)

service only allows to originate calls and implies an opportunity cost for the end user, for the time and energy involved in his or her displacement from their homes or workplaces, to the public telephone booth.

The *statement* on network expansion and modernization: Every four years Telmex must submit a plan for the expansion and modernization of the telecommunications network that should be agreed by the regulator (SCT). In the beginning of the implementation of this plans (1990-1994) it was agreed, by both parties, that the network must grow at an annual rate of 12.0 per cent. It was also agreed that the expansion should at least keep this rate of growth in the years to follow.<sup>7</sup>

### 3. The *statement* on Public telephone booths

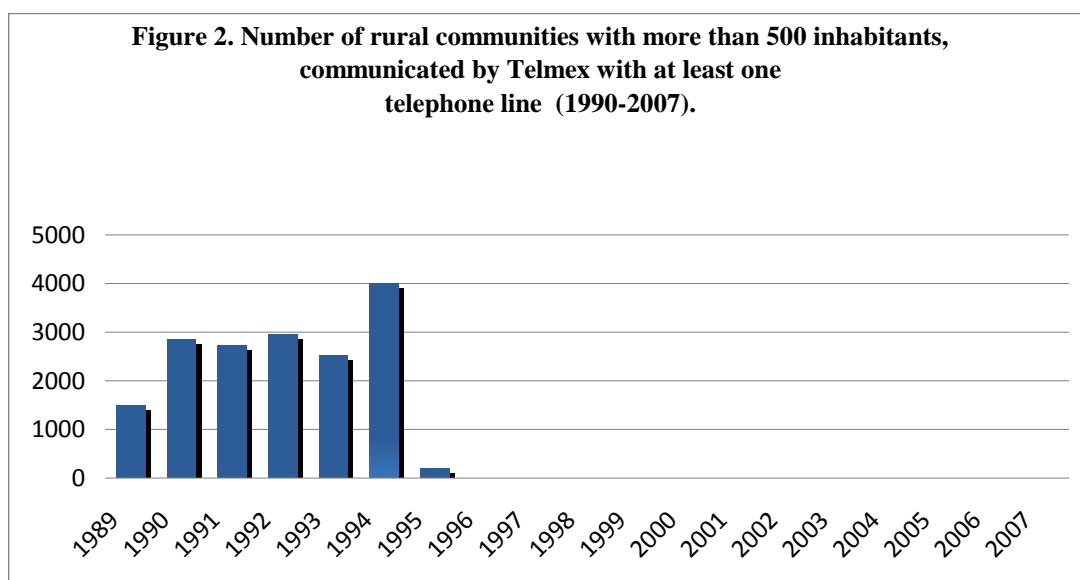
In regard to the universal access policy, through public telephone booths, Telmex’s license established the obligation of this operator to provide one booth for every 500 inhabitants (in towns larger to these number o inhabitants) in 1995 and two of these services for 1968.<sup>8</sup>

The *compliance*: The proposed density is similar to countries such as Bhutan, Ethiopia, Guinea, Madagascar y Pakistan, whose goal was to provide one or two telephone booths in communities with at least 500 inhabitants (IUT, 1968) and far below the minimum standard provided by the Union of International Telecommunications, which recommended the installation of a booth from a walking distance everywhere in the community (UIT, 1968).<sup>9</sup>

In contrast other developing with economies smaller than the Mexican defined more social reasonable policies for universal access, for example:

- Costa Rica a public booth within 1 km. radius,
- Kenya a public booth at any walking distance,
- Mozambique and Togo a public booth within a radius of 5 km.,
- Zambia a public booth in every public building: school, hospitals, government office.

In spite of the fact that public telephone booths was the strategy mostly used by Telmex to fulfill its social obligations In addition on the compliance with the commitment of providing public access through public telephone booths was insufficient. At the end of 1998, Telmex admitted that had only installed 3.19 public booths for 1,000 inhabitants. Taking in account that Mexico’s population at the time was 96 millions, Telmex would have had to install at least 480 thousand public booths in order to comply with the social obligation in its license. As mentioned, the communicated areas grew insignificantly in 1995 and 1996, and stopped indefinitely since 1997 (see Figure 2).



<sup>7</sup> Condition 3-2, Ibid “*Modificación de su Título...*”

<sup>8</sup> Condition 3-4 on Rural Telephony, Ibid “*Modificación de su Título...*”

<sup>9</sup> ITU (1998). *World Telecom Development Report 1998: Universal Access*, Ginebra.

The commitment to provide basic service under the premise of universal access, through public booths in Mexico, according to Telmex's license, is far below the challenge of providing services to the poorest communities of Mexico. Particularly in the context of a large deficit of telecommunications services in country as a whole: on average, only six households of every ten have a line connection, 66 percent of the households in the cities with 10,000 inhabitants or more and 26.6 per cent in towns with between 500 inhabitants and 2,500 inhabitants (see Table A-1 in the Appendix).

**Table 1. Telmex's provision of services under the terms of its license in communities with more than 500 inhabitants.**

	Accumulated	Annual	%
1990	4,350	2,854	190.8
1994	16,542	4,006	32.0
1995	16,735	193	1.2
<b>Average rate of growth in the period: 1990-1995</b>			<b>56.94%</b>
2000	16,738	0	0
2005	16,738	0	0
2007	16,738	0	0

Source: Our own estimations based on SCT. *Annual Reports* (several years)<sup>10</sup> and statistics from the *Federal Telecommunications Commission*.<sup>11</sup>

The arguments presented by Telmex to justify the indefinite halt of growth since 1994 in the communication of the rural areas were: the anticipation of the liberalization of the long distance services and the entering of new players in 1996. In 1994, Telmex argued that universal obligations would have to be shared with the entering operators. This argument was not a reasonable justification for not complying with Telmex's commitments, since this company was the operator of the switched public network. To expect new operators, to handle social obligations, at soon as they entrance to the market, would have created negative incentives for further investment in the expansion of the new networks, for areas not covered by the incumbent, and would have created barriers of entry for potential new players in the telecommunication services markets, and therefore less competition.

An additional *statement* on the expansion and modernization of the network: before the end of 1994, Telmex should have communicated rural communities with more than 500 inhabitants, according to the 1990 Population Census (and less than 2,500 according to the definition of rural communities by Mexico's Census Bureau).<sup>12</sup>

The *compliance*: there is an overestimation of the rural communities served by Telmex, reported by this operator. Based on the information provided by Mexico's Statistics Bureau, there were less rural communities of 500 to 2,500 inhabitants, than the number reported as served by Telmex. The size of this overestimation is by 2,919 communities in 24 states (see Table 1, and Table A-2 in the Appendix).

## **2. The *statement* on "Rural Telephony Networks:" For communities between 2,500 and 5,000 inhabitants:**

This condition should only be fulfilled by Telmex, if is there was at least 100 applications and an advanced payment equivalent to three months of basic rent. Telmex would have 18 months as grace period to deliver the service. After 1998, Telmex was expected to negotiate with the regulator the conditions for the installation of more telephone booths.<sup>13</sup>

The *compliance*: In a strict sense, this clause it was not related to a universal service obligation by the incumbent, but to the expansion of Telmex's commercial services, which could have been very profitable for this company, since this clause assured a lucrative operation within communities that mostly originate and receive long distance traffic.

<sup>10</sup> Secretary of Communications and Transport (SCT) *Annual Report* ("Anuarios Estadísticos"): [http://www.e-comunicacionesytransportes.gob.mx/wb2/eMex/eMex\\_Anuarios\\_estadisticos\\_del\\_sector\\_and\\_COFETL](http://www.e-comunicacionesytransportes.gob.mx/wb2/eMex/eMex_Anuarios_estadisticos_del_sector_and_COFETL) at:

<sup>11</sup> <http://www.cofetel.gob.mx>

<sup>12</sup> Condition 3-2, *Op. cit.* "Modificación de su Título..."

<sup>13</sup> Condition 3-4 on Rural Telephony, *Op. cit.* "Modificación de su Título...."

**Table 2. Ratio between rural communities communicated by Telmex and total of rural communities.**

State	Rural communities communicated by Telmex	Communities with a population between 500 and 2,499 inhabitants	Communities with a population between 2,499 and 5,000 inhabitants	Rural communities communicated by Telmex and total of rural communities	Level of Margination
Queretaro	309	263	296,254	1.2	Medium
Tabasco	678	609	632,455	1.1	High
Hidalgo	735	681	666,370	1.1	High
Quintana Roo	122	115	109,975	1.1	Low
Guerrero	932	824	792,066	1.1	Very High
Jalisco	584	442	489,105	1.3	Low
Veracruz	1,779	1,541	1,459,527	1.2	High
Nayarit	257	196	208,150	1.3	Medium
Campeche	135	111	108,663	1.2	High
Colima	56	40	42,439	1.4	Low
Sonora	230	178	171,009	1.3	Low
Guanajuato	1,179	908	876,530	1.3	Medium
Aguascalientes	181	126	133,074	1.4	Low
Oaxaca	1,362	1,010	997,711	1.3	Very High
Yucatan	322	190	230,578	1.7	High
Michoacán	1,036	707	717,992	1.5	High
Sinaloa	632	432	435,189	1.5	Medium
San Luís Potosí	646	483	432,272	1.3	High
Zacatecas	516	320	322,858	1.6	Medium
Coahuila	238	132	136,983	1.8	Very Low
Durango	436	236	239,082	1.8	Medium
Chihuahua	372	156	168,780	2.4	Low
Tamaulipas	373	152	148,682	2.5	Low
Nuevo León	232	75	79,816	3.1	Very Low
<b>Total</b>	<b>16,738</b>	<b>13,819</b>	<b>13,938,122</b>	<b>1.2</b>	<b>NA</b>

Source: Our own estimations based on SCT. *Annual Reports* (several years) and CONAPO, 2005.<sup>14</sup>

#### IV. Rural telecommunications services for communities under 500 inhabitants: direct government subsidy

This section focuses on the analysis of the results of the *Sector Programs* (“Programas Sectoriales”) elaborated by the Secretary of Communications aimed at providing telecommunication services to rural communities. This programs originally focused on small towns with less than 500 inhabitants (1990- 2002), later with the establishment of the *Social Coverage Fund* (FONCOS) the focus of these programs were communities between 400 to 2,500 inhabitants. As a result, 28,966 small rural communities were communicated; additional 4,231 rural communities were covered from 2001 to 2006.

The data showed that the policy intervention focused on the poorest communities of Mexico (with the lowest PIB per capita) and even in the cases where regions of higher income were served, it is likely that the subsidy focused to the more needy rural communities, based on the size of these towns, that are generally are located in remote and isolated areas (see Table 3). There are only two exceptions to this finding: the first is the little attention to Chiapas, where only 22.7 per cent communities were served. Chiapas is the state with the lowest income per capita of the country, and has one of the lowest line connections in Mexico (only three households of every ten have a line). In contrast the highest telecommunications coverage is identified in the state of Mexico, neighboring Mexico City, with a high income per capita. In spite of the fact that he communities covered were poor and small, they would have better chances to be incorporated by telecommunication operators and yet, 81.6 per cent of the towns were served, which represents 3.6 times more than Chiapas and thrice more than national average (see Table 3).

<sup>14</sup> See: *National Population Council* (‘Consejo Nacional de Población:’) <http://www.conapo.gob.mx/publicaciones/indice2005.htm>

**Table 3. Rural Communities with less than 500 inhabitants by marginalization and PIB per capita 20 states, 2006.<sup>15</sup>**

State	Total number of Communities by state	Rural communities communicated	%	Level of marginalization		PIB per capita
<b>Total Nacional</b>	<b>184,748.0</b>	<b>50,480.0</b>	<b>27.3</b>	---		---
Chiapas	19,237.0	4,366.0	22.7	Very high	4	28.6
Oaxaca	10,025.0	3,625.0	36.2	Very high	4	32.5
Tlaxcala	1,138.0	226.0	19.9	Medium	2	37.3
Guerrero	7,066.0	2,532.0	35.8	Very high	4	39.4
Zacatecas	4,498.0	1,332.0	29.6	Medium	2	39.7
Michoacán	8,965.0	2,897.0	32.3	High	3	39.9
Hidalgo	4,442.0	2,316.0	52.1	High	3	41.6
Nayarit	2,547.0	610.0	23.9	Medium	2	42.1
Veracruz	20,294.0	6,163.0	30.4	High	3	44.2
<b>National Average</b>	<b>5773.375</b>	<b>1577.5</b>	<b>23.3</b>	---		<b>70.5</b>
Estado de México	4,378.0	3,572.0	81.6	Low	1	51.3
Tamaulipas	7,452.0	1,035.0	13.9	Low	1	83.1
Sonora	7,320.0	845.0	11.5	Low	2	85.4
Aguascalientes	1,826.0	313.0	17.1	Low	2	85.6
Baja California Sur	2,450.0	244.0	10.0	Low	2	89.2
Baja California	3,918.0	272.0	6.9	Ver low	0	93.0
Coahuila	3,894.0	615.0	15.8	Ver low	0	98.3
Chihuahua	12,095.0	1,223.0	10.1	Low	2	102.9
Quintana Roo	1,800.0	299.0	16.6	Low	2	107.5
Campeche	2,595.0	375.0	14.5	High	3	121.7
Nuevo León	5,169.0	793.0	15.3	Very low	0	133.1
Distrito Federal	450.0	0.0	0.0	Very low	0	185.5

Source: Our own estimations based on SCT Annual Reports (several years) and statistics from the Federal Telecommunications Commission.

## V. Public Internet access: Digital Community Centers.

In order to assess the efficiency of the policy initiated by the government to provide universal access to the Internet through the Digital Community Centers, we began by the assumption on the most likely targeted population, which include school attending population: children and young people on school age, from elementary to higher education and young adults (to 40 year old), by each state of the Mexican Republic. Then we use a ratio between this population and the number of Digital Community Centers, in each of these states. This exercise gave us information on the potential demand for these services and the supply of them resulting in the following figures.

## VI. Public Internet Access: Digital Community Centers.

Practically every county in the country has at least one Digital Community Center (CCD). However, there are differences among counties in the size of their territories, population, education, levels and quality of education opportunities, migration both within Mexico or International, mainly to the United States, natural resources, dominant economic activity of the region where the counties are located, their vicinity to a city or rural y remote areas with little to mention only few of the of factors that makes the Mexican Republic many different regions within a country.

On the other hand is easy to venture that in the towns or rural areas with more physical infrastructure, including telecommunication facilities, are those with higher levels of development, higher income per capita and higher levels of human capital (education and health), these counties and regions have also a better access to the Internet, either in their homes, at school or in commercial facilities. This triggers the interest to analyze the distributive effect of the public policy of access to the Internet, which depends on government subsidy, through

<sup>15</sup> The table only includes 20 of the 32 states of Mexico. The Table including the 32 states can be found in the Appendix, see table A-2.

the Digital Community Centers (CCDs). With this purpose it is examined the location of the CCDs, identifying the level of development /marginalization of the states<sup>16</sup> where they are located, and estimated a ratio of the potential target population of these facilities between the availability of these Centers.

In order to analyze the potential impact of the CCDs among the population, we define a possible target population, based on the assumption of level of literacy and age. The study considered the population on both genders between 10 and 40 years old, assuming that the children of the fourth and fifth graders and more, and young adults, with an average education of the primary education, were more interested in the potential use of the services and information provided through the Internet, and had higher levels of education to access and use the services provided by the Internet.

The results of the analyses showed that in every state, including Mexico's capital city: Mexico City or DF has CCDs, although the average density at a national level is very low: 6.1 CCDs per 8,740.0 people.

The analysis of the distribution of the CCDs shown that the largest concentration of CCDs per population, was Mexico City itself, 4,380.9 for every 118.4 people, which is the location with higher income, greater coverage of every single telecommunication service, large wire and wireless connection, the best and greater public services infrastructure and the highest level of human capital concentration. Also México City has the highest possibilities to access to the Internet at home, in the education institutions, public libraries, government offices, and commercial sites (Table 4).

The CCDs density decreased in the other states considerably; nevertheless it was in the higher income states those who had a larger concentration of CCDs per target population, as shown in Table 4. In these "higher income" states, the average of CCDs per (target) population was 9.4 CCDs per 2,981.0 persons, whereas in the "lower income" states, the average was 4.4 CCDs per 5,759.0 people (Table 5).

In sum, the effort of public policy in regard to facilitate the access to the services and information through the Internet, not only is extremely thin, but also it has reinforced the supply of Internet services by the market, instead of having a counter market effect by reaching the population that has less opportunities to access the Internet, because of the remoteness of the location where they live and work, or because of their level of income.

An argument, related with the possibility of the poor, not only to access but to be able to appropriate the use of these information technologies may be raised, making the case that given the level of poverty, undernourishment and illiteracy of these population, it is not worth the effort to cover the areas with Internet access.

However, the set of policies to reduce poverty and promote economic development are design counting on the Internet as the best conduit to reach the neediest population. In this paper it is address the case of education as an example. In the field of public education, this argument, in practice contradicts the effort done on distance education, in the foremost primary education in the present decade in Mexico name "Enciclomedia,<sup>17</sup>" which resulted as an agreement between Microsoft and Mexico's Secretary of Education. Since the beginning of the present decade this innovative program supplemented the traditional primary education, with additional bibliography, through video and audio resources, and interactive activities. The program facilitate the access to "Encarta" to encourage education based on research and discovery. This leading education program has as its platform the Internet. The flexibility of "Enciclomedia" allows the program to adjust to the specific circumstances and indigenous languages where the program is implemented, with subtitles in every language used in Mexico.

For young and adult population who have drop out from school, mainly for economic reasons, the National Institute for Adult Education has proposed the model of education for a better life and better employment opportunities that reaches every corner of the country with a chapter for indigenous population in their own language. The main platform for this program is again the Internet. The road ahead children early stimulation, health, housing and employment programs is still very challenging, however is highly probable that the chosen conduit will be the Internet, which lead us to the recommendation of emphasizing the effect of universal access to the information technologies, through public institutions, including the CCDs with a redistributive (progressive) perspective, as opposed to what has been observed until recently in which the subsidy is reinforcing the already privileged population having a regressive effect.<sup>18</sup>

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<sup>16</sup> Information on the location of the CCDs by county was available (*Secretary of Communications and Transport, SCT*)" by the office in charge of planning and implementing the development of these Centers: "*Coordinación Nacional de e-México.*" However, information on the levels of development (income per capita and level of marginalization) and on population was only available at state level. For this reason, the different states became our unit for this analysis.

<sup>17</sup> See: <http://www.encyclomedia.edu.mx/>

<sup>18</sup> See: <http://www.conevyt.org.mx/cursos/> and <http://bibliotecadigital.conevyt.org.mx/>

**Table 4. Ratio of CCD's and targeted Population and Distribution by states, and level of development, in the higher income states.**

States	Population 10-40 years of age	Poverty Index	Poverty level	PIB / capita	CCDs	Population/ CCD's
<b>National</b>	<b>53,175.6</b>				<b>8,740.0</b>	<b>6.1</b>
<b>Regional</b>	<b>27,964.6</b>		<b>1</b>		<b>2,981.0</b>	<b>9.4</b>
Distrito Federal	4,380.9	Very Low	0	185.5	37	118.4
Baja California	1,461.2	Very Low	0	93.0	82	17.8
State of México	7,311.1	Low	1	51.3	416	17.6
Nuevo Leon	2,191.3	Very Low	0	133.1	160	13.7
Morelos	804.3	Low	1	64.9	66	12.2
Tamaulipas	1,557.1	Low	1	83.1	155	10.0
Jalisco	3,450.7	Low	1	69.5	422	8.2
Colima	1,631.6	Low	1	70.0	234	7.0
Chihuahua	291.9	Low	1	102.9	43	6.8
Aguascalientes	559.2	Low	1	85.6	83	6.7
Baja California Sur	268.8	Low	1	89.2	45	6.0
Quintana Roo	581.1	Low	1	107.5	107	5.4
Coahuila	2,257.6	Very Low	0	98.3	424	5.3
Sonora	1,217.8	Low	1	85.4	707	1.7

**Table 5. Ratio of CCD's and targeted Population and Distribution by states, and level of development, in the lower income states.**

	Population 10-40 years of age	Poverty Index	Poverty level	PIB / capita	CCDs	Population/ CCD's
<b>National</b>	<b>53,175.6</b>				<b>8,740.0</b>	<b>6.1</b>
<b>Regional</b>	<b>25,211.1</b>				<b>5,759.0</b>	<b>4.4</b>
Oaxaca	1,777.1	Very High	4	32.5	890	2.0
Guerrero	1,573.8	Very High	4	39.4	293	5.4
Chiapas	1,295.8	Very High	4	28.6	146	8.9
Veracruz	3,614.8	High	3	44.2	602	6.0
Puebla	2,784.6	High	3	50.8	535	5.2
Tabasco	1,079.7	High	3	47.6	495	2.2
Hidalgo	1,212.5	High	3	71.4	455	2.7
Michoacán	2,023.9	High	3	39.9	320	6.3
San Luis Potosí	1,232.2	High	3	57.2	294	4.2
Yucatán	948.7	High	3	59.1	268	3.5
Campeche	406.1	High	3	121.7	152	2.7
Zacatecas	700.3	Medium	2	39.7	245	2.9
Sinaloa	1,323.0	Medium	2	82.0	243	5.4
Guanajuato	2,559.60	Medium	2	52.0	206	12.40
Durango	773.6	Medium	2	65.0	185	4.2
Tlaxcala	569.6	Medium	2	37.3	184	3.1
Querétaro	854.5	Medium	2	83.3	144	5.9
Nayarit	481.3	Medium	2	42.1	102	4.7
<b>AVERAGE</b>	<b>1,661.7</b>		<b>3</b>	<b>55.2</b>	<b>273</b>	<b>4.9</b>

## VI. Expenditure in telecommunication services by the poorest population and income distribution

In addition to the previous analysis, in this section the distribution of telecommunication services is analyzed, according to the different levels of household income. These analyses took as a point of departure the division of households in deciles, according to their level of income and examined their expenditure on telecommunication services. The source of information was the *Household Income and Expenditure Survey*, for 2006 (the latest available), based on a representative sample, nationwide. Each decil comprises the same amount of households,

which are ranked from the lowest to highest income. Comparing the lowest income decil with the highest, this last is 30 times higher.

## 1. Access to the services and Income Distribution

Those households within the lowest income decil (the poorest) have a significant less access to telecommunication services, as compared with the households with higher income. In the lowest decil, only two households, of every 10 have a home line connection. In contrast in the highest income decil, nine of every 10 has a wire line connection in their homes. Very similar figures can be found for the mobile services (see Table 4, below).

In the case of cable or satellite services, that technical capability for supporting telecommunication services, and is actually used by many countries, including Mexico. In the case of this country, the distribution of these service are even more skewed than the wire or wireless services: in the lowest decil only five per cent of the households have access to the TV based on this infrastructure, while 75 per cent of households, in the highest income decil have this service. The most dramatic case of the unequal distribution is found in the access to the Internet, while 60.1 per cent of the households in the highest income have access to the Internet, only 0.02 percent has this service at their homes (see Table 6).

**Table 6. Telecommunication services distribution according to households' income (deciles), 2006.**

Service	Deciles									
	1	2	3	4	5	6	7	8	9	10
Wire line connection	22.6	45.8	56.4	66.5	76.2	78.5	83.4	87.7	91.7	92.6
Mobile service*	22.1	42.2	52.0	65.2	70.4	77.7	82.1	87.0	91.1	86.7
Cable or Satellite TV	5.0	12.7	17.5	26.2	32.6	41.5	50.3	62.3	72.3	75.8
Internet	0.2	1.7	3.4	7.2	11.4	17.4	27.2	41.4	56.1	60.1

Source: Our estimations based on INEGI: ENIGH, 2006. \* Mobile services are accounted when at least one member of the household has a mobile line.

## 2. The expenditure on telecommunication services and income distribution

The expenditure of the poorest households in telecommunication services, as a percentage of their total expense, is two times higher than the expenditure of the wealthiest households: 4.2 per cent in the lowest deciles and 1.9 per cent in the highest deciles. These results suggest that the demand for telecommunication services tends to be inelastic; people demand these services regardless of their income.

**Table 7. Expenditure in telecommunications as a percentage of total expenses by decil (2006=100)**

Decil	Average households' income per quarter MEX pesos	Expenditure in telecommunications as a percentage of total expenses
1	3,320	4.2%
2	7,174	4.1%
3	10,042	4.3%
4	12,739	4.3%
5	15,845	4.4%
6	19,506	4.5%
7	24,246	4.2%
8	31,472	3.8%
9	43,796	3.2%
10	99,215	1.9%

Source: Our estimations based on INEGI: ENIGH, 2006.

The larger share of the expenditure of poorest families is explained by the fact that they live in remote and isolated areas and depend more on public telephone booths, and on mobile services, which tend to be more expensive. Mobile services in Mexico have one the highest prices as compared to developing and developed countries (see Table 6).

**Table 8. Average Revenue per User (ARPU), 2008**

	Average Revenue per User (ARPU)		PIB per capita	ARPU / PIB per cápita*
<b>Latin America</b>	Colombia	131.0	7,400	1.77
	<b>Mexico</b>	<b>178.0</b>	<b>12,400</b>	<b>1.44</b>
	Brazil	17.2	9,500	0.18
	Chile	17.0	14,300	0.12
	Argentina	12.2	13,100	0.09
	Venezuela	1.2	12,800	0.01
	Peru	0.3	7,600	0.00
	<b>Average</b>	<b>51.0</b>	<b>11,014.3</b>	<b>0.46</b>
<b>East Europe and the Middle East</b>	<b>Average</b>	<b>16.1</b>	<b>14114.3</b>	<b>0.11</b>
<b>Asia</b>	<b>Average</b>	<b>30.0</b>	<b>13269.0</b>	<b>0.23</b>
<b>Central Europe</b>	<b>Average</b>	<b>79.1</b>	<b>38685.7</b>	<b>0.20</b>
<b>Asia-Pacific</b>	<b>Average</b>	<b>123.9</b>	<b>39814.3</b>	<b>0.31</b>
<b>North America</b>	<b>Average</b>	<b>275.1</b>	<b>39502.4</b>	<b>0.70</b>

\*GPU (ARPU o Average Revenue per user) Resulta del valor de las ganancias por usuario como porcentaje del PIB per cápita. Fuente: Merrill Lynch, 2008 y CIA Factbook, 2008.

An additional factor that influences a larger expenditure for the poorest areas is related to the outdated definition of the Areas of Local Service, which has no technical or economic (costs) support and artificially imposes a definition of a call, as a long distance, which has a higher charge. This particularly affects the rural area population, where the largest share of their traffic consists on long distance calls. The higher expense in telecommunication services has an opportunity cost for the poorest population in terms of other expenses like health, nutrition, education, home maintenance, as well as a higher investment in productive activities.

These results also suggest that the provision of telecommunication services under the “universal access” or “universal service”, are lagging behind the unattended demand for these services. This leaves the poorest population dependent on the supply of these services, at market prices with mostly wireless services, which are more expensive and hardly affordable for them.

## **VII. Conclusion**

Nevertheless, in Mexico, almost 20 years after the privatization of the telecommunications services by the incumbent, Teléfonos de México, the premise of universal service has not been fulfilled.

In fact, as an average, only five households of every 10 has access to basic telephone service and in some states such as Oaxaca, only two of 10 households have access to a telephone line, and three in the states of Tabasco and Chiapas.

This condition may imply that, in contrast to what has been the goal of the universal service policy in Mexico, namely social inclusion and overcoming the poverty situation, it has become a regressive tax for the poorest population of Mexico.

Finally, the paper suggest what have been the pitfalls on the regulation and on the regulation implementation by the authorities, that have influenced on the limited results achieved by the telecommunication services policies, targeted to the poorest regions of Mexico.

**Appendix:**

**Table A-1. Fixed Line Connection.**

State	% Households	Marginalization level	PIB per capita
<b>National Average</b>	<b>48.9</b>	---	
Distrito Federal	76.4	Very low	185.5
Nuevo León	68.5	Very low	133.1
Chihuahua	60.3	Low	102.9
Jalisco	60.0	Low	69.5
Coahuila	58.4	Very low	98.3
Aguascalientes	57.7	Low	48.5
Baja California Sur	57.5	Low	89.2
Colima	57.2	Low	70
Morelos	56.6	Low	64.9
Baja California Norte	56.5	Very low	93
Sonora	55.9	Low	85.4
Estado de México	53.8	Low	51.3
Tamaulipas	52.8	Low	83.1
Guanajuato	52.4	Medium	52
Sinaloa	52.4	Medium	55.1
Guerrero	49.8	Very high	39.4
San Luís Potosí	49.3	High	57.2
Durango	49.0	Medium	65.0
Querétaro	48.0	Medium	83.3
Tlaxcala	47.8	Medium	37.3
Nayarit	46.3	Medium	42.1
Zacatecas	44.1	Medium	40
Michoacán	43.9	High	39.9
Puebla	41.1	High	50.8
Quintana Roo	38.9	Bajo	107.5
Yucatán	38.0	High	59.1
Hidalgo	37.7	High	41.6
Campeche	37.3	High	121.7
Veracruz	36.9	High	44.2
Chiapas	31.3	Very high	28.6
Tabasco	27.3	High	47.6
Oaxaca	21.9	Very high	32.5

The ranking of the state is based on the availability household fixed line connection.

There are four members per household. Source: Our estimations based on: INEGI: ENIGH, 2006, CONAPO, 2005; INEGI-BIE, 2005.

**Table A-2. Rural Communities with less than 500 inhabitants by marginalization and PIB per capita 20 states, 2006.**

Entidad	Número de localidades rurales	Localidades rurales comunicadas	% Comunidades	Grado de marginación	PIB per cápita
<b>Total Nacional</b>	<b>184,748.0</b>	<b>50,480.0</b>	<b>27.3</b>	---	---
Chiapas	19,237.0	4,366.0	22.7	Muy Alto	28.6
Oaxaca	10,025.0	3,625.0	36.2	Muy Alto	32.5
Tlaxcala	1,138.0	226.0	19.9	Medio	37.3
Guerrero	7,066.0	2,532.0	35.8	Muy Alto	39.4
Zacatecas	4,498.0	1,332.0	29.6	Medio	39.7
Michoacán	8,965.0	2,897.0	32.3	Alto	39.9
Hidalgo	4,442.0	2,316.0	52.1	Alto	41.6
Nayarit	2,547.0	610.0	23.9	Medio	42.1
Veracruz	20,294.0	6,163.0	30.4	Alto	44.2
Tabasco	2,430.0	1,602.0	65.9	Alto	47.6
Puebla	6,082.0	2,852.0	46.9	Alto	50.8
Estado de México	4,378.0	3,572.0	81.6	Bajo	51.3
Guanajuato	8,511.0	3,438.0	40.4	Medio	52.0
Sinaloa	5,790.0	1,508.0	26.0	Medio	55.1
San Luís Potosí	6,827.0	1,944.0	28.5	Alto	57.2
Yucatán	2,228.0	497.0	22.3	Alto	59.1
Morelos	1,276.0	313.0	24.5	Bajo	64.9
Durango	5,968.0	1,143.0	19.2	Medio	65.0
Jalisco	10,464.0	2,514.0	24.0	Bajo	69.5
Colima	1,095.0	138.0	12.6	Bajo	70.0
<b>Media nacional</b>	<b>5773.375</b>	<b>1577.5</b>	<b>23.3</b>	---	<b>70.5</b>
Tamaulipas	7,452.0	1,035.0	13.9	Bajo	83.1
Querétaro	2,518.0	878.0	34.9	Medio	83.3
Sonora	7,320.0	845.0	11.5	Bajo	85.4
Aguascalientes	1,826.0	313.0	17.1	Bajo	85.6
Baja California Sur	2,450.0	244.0	10.0	Bajo	89.2
Baja California	3,918.0	272.0	6.9	Muy Bajo	93.0
Coahuila	3,894.0	615.0	15.8	Muy Bajo	98.3
Chihuahua	12,095.0	1,223.0	10.1	Bajo	102.9
Quintana Roo	1,800.0	299.0	16.6	Bajo	107.5
Campeche	2,595.0	375.0	14.5	Alto	121.7
Nuevo León	5,169.0	793.0	15.3	Muy bajo	133.1
Distrito Federal	450.0	0.0	0.0	Muy Bajo	185.5

Fuente: Elaboración propia a partir de datos de INEGI: Censo de Población y Vivienda, 2005, SCT: Anuario Estadístico, 2006 y CONAPO: Índices de marginación 2005.

**Table A-3. Distribution of Rural Telephone Lines in Mexican Entities.**

State	Rural communities communicated by Telmex	Communities with a population between 500 and 2,499 inhabitants	Communities with a population between 2,499 and 5,000 inhabitants	Ratio between rural communities communicated by Telmex and total of rural communities	Level of Marginization
Baja California Sur	24	116	120,101	0.2	Very Low
Tlaxcala	109	152	191,504	0.7	Medium
Morelos	107	126	144,107	0.8	Low
Baja California	29	34	38,006	0.9	Low
Chiapas	950	1210	1,134,929	0.8	Very High
E. de México	1,137	1,254	1,349,283	0.9	Low
Puebla	1,040	995	1,059,597	1.0	High
Queretaro	309	263	296,254	1.2	Medium
Tabasco	678	609	632,455	1.1	High
Hidalgo	735	681	666,370	1.1	High
Quintana Roo	122	115	109,975	1.1	Low
Guerrero	932	824	792,066	1.1	Very High
Jalisco	584	442	489,105	1.3	Low
Veracruz	1,779	1,541	1,459,527	1.2	High
Nayarit	257	196	208,150	1.3	Medium
Campeche	135	111	108,663	1.2	High
Colima	56	40	42,439	1.4	Low
Sonora	230	178	171,009	1.3	Low
Guanajuato	1,179	908	876,530	1.3	Medium
Aguascalientes	181	126	133,074	1.4	Low
Oaxaca	1,362	1,010	997,711	1.3	Very High
Yucatan	322	190	230,578	1.7	High
Michoacán	1,036	707	717,992	1.5	High
Sinaloa	632	432	435,189	1.5	Medium
San Luís Potosí	646	483	432,272	1.3	High
Zacatecas	516	320	322,858	1.6	Medium
Coahuila	238	132	136,983	1.8	Very Low
Durango	436	236	239,082	1.8	Medium
Chihuahua	372	156	168,780	2.4	Low
Tamaulipas	373	152	148,682	2.5	Low
Nuevo León	232	75	79,816	3.1	Very Low
Distrito Federal	0	5	5,035	0.0	Very Low
<b>Total</b>	<b>16,738</b>	<b>13,819</b>	<b>13,938,122</b>	<b>1.2</b>	<b>NA</b>

Source: Our estimations based on: SCT Annual Report (2006), CONAPO, 2005.