Research Article

Strategic Use of Mobile Telephony at the Bottom of the Pyramid: The Case of Mexico

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Abstract

The growing importance of mobile telephony for users at the bottom of the pyramid is reflected in the high proportion of their incomes devoted to this service. Evidence from communities in the developing world, where low-income users have developed strategies to minimize costs while continuing to benefit from access to communication, has opened new lines of research. Based on a survey of 1,000 mobile telephony users carried out in 2007, the present study assesses the strategies practiced by mobile users in two metropolitan areas of Mexico. The results show that the main short-term strategies to minimize the costs of mobile telephony are 1) using the phone only to receive calls, and 2) the use of SMS. In both cases, the main determinant of whether users at the bottom of the pyramid use cost-reduction strategies is their low economic status.

Introduction

Empirical evidence shows that, for low-income sectors, the ability to communicate is of prime importance, and that in many cases, mobile telephony has turned out to be the only or the best option; it is considered *a necessary and inelastic good* (Frost & Sullivan, 2006; Bjärhov & Weidman, 2007; INEGI, 2006a). Consequently, in the coming years, there is expected to be considerable growth in the number of low-income mobile users in the developing world, as well as a higher degree of maturity of use among low-income consumers (Dymond & Oestmann, 2003).[1]

At the same time, competition in the mobile telephony market has spurred operators to seek out new markets, especially in low-income sectors that have increasingly joined the use of this technology in the past few years. Recently, much greater importance has been placed on lower-income groups in terms of both marketing and innovation (Prahalad, 2004).[2]

A significant proportion of low-income mobile users make a major economic effort, adopt strategic decisions, and employ various practices—some of them very creative—to engage in communication with the lowest expense by taking advantage of mobile telephony service models and technologies (Donner, 2007).[3] Numerous studies illustrate these strategies

1. For this study, maturity in mobile phone usage refers to the degree of adoption and knowledge of the device and the services offered by mobile telephony. Maturity is normally acquired through practice over time.
2. There are numerous examples, such as Unilever and Procter & Gamble in India, Casas Bahia in Brazil, and Cemex in Mexico, among others, that demonstrate that people in developing countries with annual incomes of less than US$1,500 seek both competitive prices and quality in the products they purchase.
3. The National Institute of Statistics, Geography and Informatics (INEGI, 2006a) reports that, between 2004 and 2006,

and practices in different locations of the developing world: Asia (Zainudeen et al., 2006; Chakraborty, 2004; Aminuzzaman, 2005), Africa (Donner, 2007; Gamos, Ltd., 2003; Dymond & Oestmann, 2003), and Latin America (Frost & Sullivan, 2006; Mariscal, 2008; Ureta, 2008).

Of particular interest is the work of Zainudeen et al. (2006), who distinguish between short-term and long-term strategies. Both involve conscious decisions, with the main goal being the reduction of costs associated with mobile telephone use. The difference lies in the frequency with which such decisions are made. Short-term strategies, such as beeping or missed calls and the use of short text messages (SMS), are practiced on a daily basis. On the other hand, long-term strategies involve non-daily decisions, such as whether to purchase a mobile handset, whether to purchase a new or used handset, what type of payment plan to choose—prepaid or postpaid—and which types of telephony to use: mobile only, mobile and public, or mobile and fixed. Within this context, the aim of this study is to identify the cost-reduction strategies employed by low-income mobile telephony users in the Metropolitan Zone (MZ) of Mexico City and the MZ of Tuxtla Gutiérrez (located in the Mexican state of Chiapas).[4]

This report is divided into five sections. The first is a review of literature that addresses the experiences in other developing countries where strategies used by low-income sectors to minimize the cost of mobile telephony have been identified. The second section provides information on mobile telephony in Mexico, and particularly in the specific locations studied: Chiapas, Estado de Mexico, and Mexico City. The third section outlines the methodology used to conduct the survey, and it also includes an explanation of the Unsatisfied Basic Needs Index (INBI) and its benefits. The fourth section presents the main findings with regard to both long-term and short-term strategies, while the fifth and final section offers conclusions and reflections.

Literature Review

Recent empirical studies reveal that individuals who earn low incomes devote a considerable amount of their earnings to accessing telecommunications services. In general, a significant portion of telecommunications consumers spend between 2% and 3% of their income on these services, while individuals from low-income sectors in developing countries may spend as much as 10% (Intelecon, 2005; Gillwald, 2005; Souter et al., 2005). Bjärhov and Weidman (2007) note that some people spend up to 40% of their income on mobile services. They further stress that the value of communication is greater than its monetary cost, and that this is a fact that should be understood by companies seeking to target the market at the so-called bottom of the income pyramid. Figures like these demonstrate the increase in the consumption of these services by low-income sectors of the population and the extent to which low-income individuals consider communication to be necessary. At the same time, the figures highlight the challenges faced by these sectors due to the high costs of mobile service and constraints on their spending capacity.

The research conducted by Zainudeen et al. (2006) among the "financially constrained" in 11 localities in India and Sri Lanka led them to conclude that the size of the initial investment—in other words, the purchase of a mobile handset—continues to be the main barrier for non-users, and even for those who use mobile service only occasionally. The authors found that the high cost of mobile services and the constraints on these users' incomes have led them to develop strategies involving the adoption of short-term and long-term tactics to reduce costs. For example, users may face the decision of whether to invest in a mobile handset or to use a rented or borrowed one instead, and, once they have decided to purchase a handset, they must decide whether to purchase a new or used device. According to the data from Zainudeen et al.'s sample, more than 70% of mobile owners had purchased new handsets, and close to one third of Indian mobile owners had second-hand devices, while 10% had obtained their handset free of charge, either as a gift or by some other means. While joint ownership of mobile phones was not observed to be a common strategy, in 15% of cases in India and 7% in Sri Lanka, the mobile phone was

low-income users have increased their expenditure on mobile telephony. This increase has implied a decrease in expenditure on other areas, such as cleaning products, home maintenance, personal grooming, clothing, and footwear.
4. The aim of this study is to know more about this new, growing market (the bottom of the pyramid). However, it seems that consumers of all income levels practice strategies to reduce costs (Donner, 2007).

considered to be a household phone and thus was available for use by the entire family.

The same authors found that these sectors of the population tend to use a combination of telephony modes (fixed, mobile and public)[5] as a means of reducing costs. For instance, 26% of mobile phone owners choose to make calls on public phones because they consider it to be more economical, while a considerable percentage also makes international long-distance calls from public phones because of the international direct dialing facilities they offer. A third reason for using other modes of telephony is that only 21% of mobile users automatically recharge their phones when their credit runs out, which means that there are periods when they can only receive calls on their mobiles.

Once individuals in Indian and Sri Lankan communities have acquired a mobile phone and chosen a payment plan, their use of short-term strategies for reducing costs is somewhat limited. The main short-term strategy by far was to control the length of local calls (around 70%) and, in lesser proportion, of national long-distance or international long-distance calls. This is not an innovative strategy, but rather, given the high cost of making calls from a mobile phone, a common practice in developing countries. Other strategies used, though less frequently, were to disconnect the phone after exceeding a certain number of charges, to call only certain numbers (less than 20%), and to use SMS.

In low-income communities in Botswana, Ghana, and Uganda, it was found that 80% of the people surveyed used a telephone regularly. This indicates a substantial demand (Gamos, 2003). The duration of outgoing calls was shorter than that of incoming calls. This could be due to the fact that outgoing calls were made from rural to urban areas, and people in rural areas generally have smaller incomes than those in urban areas. This practice demonstrates that, for calls between family members and friends, the expenditure is made by the person with the highest income.

In Uganda, it was observed that the practice of "beeping" is a short-term strategy commonly employed among mobile users, as is also the case in numerous other African countries. It is most frequently used so that the person who "beeps" (dials a number but disconnects before the call is answered) does not have to pay for the call, since the person who is "beeped" calls back and thus assumes the cost. This practice is made possible by the caller ID and call log features of mobile phones. Gamos (2003) reported that 45% of mobile phone users who received missed calls or beeps called back. The person who calls back is the person with the ability to pay.

The practice of beeping is widespread in the developing world. Donner (2007) notes that there are three kinds of beeps. The first is a "callback beep," used to signal the recipient to call back and therefore pay for the call. The second is the "pre-negotiated instrumental beep," used for practical purposes as a means of sending a pre-arranged message. For instance, one ring means, "I'm home"; two rings means, "I'm at work"; and three rings means, "Pick me up now." The third type is the "relational beep," which is also previously arranged and is used to transmit personal messages, like "I miss you," "I love you," and so on.[6] Donner concludes that the practice of beeping is simply a means of taking the fullest advantage of the technological features of mobile phones (call logs and address books) and payment systems (calling party pays).

A similar phenomenon has been documented in communities in Bangladesh, where mobile telephony has become so widespread and familiar that it is now the communication tool with the greatest rate of use and demand. Public access to mobile

5. Traditionally, public telephony has involved fixed-line or satellite phones in booths or offices that provide service to the public. Today, however, there are numerous cases of mobile public telephony, in what are called "calling centers" in some places. These initiatives have been particularly successful in areas where there is no fixed-line service and mobile networks have been installed. Examples include Grameen Bank, which provides financing for women micro-entrepreneurs to offer mobile telephony service to the public in rural areas of Bangladesh; and MTN Publicom, which provides public telephony service using mobile technology through a franchise business model. In Ecuador, Bell South operated 600 mobile public telephones in restaurants, stores, and service stations (Dymond & Oestmann, 2003).

6. For all three types of beeping, there must be a prior relationship and a certain level of trust between the two parties. It is not a practice that can be used with strangers or at the beginning of a relationship. Beeping and the message intrinsically transmitted are determined by the context and the length and type of relationship between the parties. The main characteristic of this practice is that it reduces the cost of mobile use while allowing people to remain in communication.

phones has been spread through "calling centers" that sometimes consist of no more than one mobile phone and a bench. The strong competition in the market for these services has led some centers to extend credit to their customers, and even to offer different options, such as the possibility of taking the phone home with them to use. The prevalence of mobile telephony has led to the development of a "culture of missed calls" or beeping in Bangladesh (Chakraborty, 2004). As in many African countries, this practice involves the use of pre-established signals and messages, and its purpose is to allow for communication at the lowest possible cost (Gamos, 2003).

The use of text messaging, or SMS, is also associated with reducing the costs of mobile telephone usage. Unlike the case of beeping, there is no need for a prior relationship or pre-established agreement, which makes SMS more useful for practical matters that do not involve personal relationships: education, health, remittances, emergencies, security, and contact with government agencies, among others. For example, in Botswana and Ghana, it was found that the main benefit associated with the use of SMS was the low cost. The use of SMS is also popular in India, with the peculiarity of there being high usage of pre-written messages stored in the phone's memory (Bhagat, 2007).

The potential of text messages lies in their low cost. They could be seen to be, and be used as, a substitute for electronic mail in developing countries, where Internet penetration is low (Dymond & Oestmann, 2003). In particular, considerable expectations have been raised by the possibilities offered by "m-transactions," especially in the context of "m-banking," to make deposits, manage bank accounts, send remittances, and submit payments through mobile phones. These opportunities would be particularly significant for individuals from low-income sectors who lack access to banking services (Coyle, 2007). SMS can also make it possible to carry out transactions for a wide range of purposes, such as government affairs, health, education, and security (Jonasson & Kruse, 2007). Carrying out transactions with a mobile phone is an incipient practice in developing countries, and there are various examples in which its potential is being tested in the developing world (Nokia, 2008; Vaughan, 2007; Roman, 2007; Ivatury & Pickens, 2006; Williams & Torma, 2007).

The strategy of community use of mobile phones has been adopted in some communities in India and Bangladesh. In villages in rural India, community use is a common practice and, as such, the shared use of mobile phones among residents is viewed as natural.

With regard to the Latin American and Caribbean region, there is little empirical evidence of cost-reduction strategies. In a study undertaken by Frost and Sullivan (2006) for GSM Latin America in rural and semi-urban areas in Argentina, Brazil, Mexico, and Colombia in 2005, it was found that one in every four people surveyed was a mobile phone user. Of these, 80.7% owned their own mobile phone, while the other 19.3% of mobile users were non-owners who shared a phone with a relative, friend, or their place of work. In general terms, shared use and ownership are most common among members of the same household because they do not have the resources for individual ownership. Mobile phones are considered a necessary good, given that 62% of users said that spending on mobile communication is the last expenditure they would reduce, and that they would use the service more if it were less costly.

As in the case of other developing countries, the combined use of mobile, fixed, and public telephony is a common practice in communities of Latin America. The use of fixed telephony does not necessarily involve a fixed telephone in the user's household, but could instead mean the use of a fixed telephone in the workplace or at a friend's or relative's home. Among the low-income population, mobile telephony is a substitute for fixed telephony. Mobile users in communities of Brazil, Argentina, Colombia, and Mexico employ cost-reduction strategies on a daily basis, including the beeping technique that is so common in Uganda, and which is used either to signal the recipient to call back or to communicate a pre-established message. Mobile users in Colombia, a country in which there is a high degree of insecurity, use beeping to let their families know that they have safely reached their destination (Frost & Sullivan, 2006), reflecting the analysis of beeping provided by Donner (2007), which indicated that a beep's uses and meanings are determined by the context and the relationship between the sender and recipient.

In the case of these four Latin American countries, the use of SMS is more common among young people, and it is also viewed as a strategy for reducing costs. The rather low use of SMS in gen-

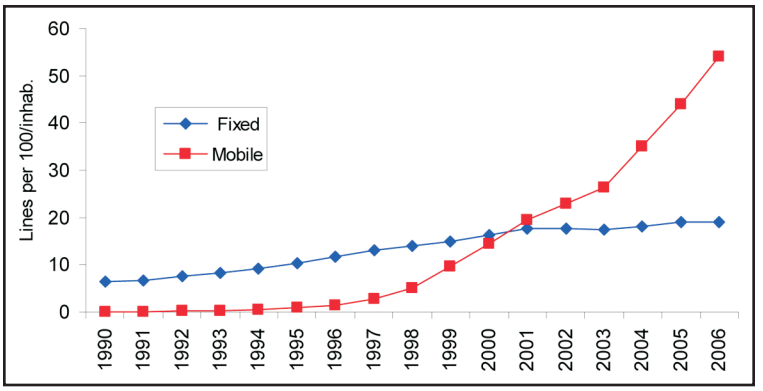

Figure 1. Fixed and Mobile Telephone Lines in Mexico (1990–2006).
Source: Telecom-CIDE, based on COFETEL (2006).

eral could be attributed to a lack of maturity among users, as well as to the use of mobile phones that do not permit text messaging (Frost & Sullivan, 2006).

In a study of low-income families in Santiago de Chile, Ureta (2008) mentioned that the amount of credit available for making calls is always limited due to a lack of funds. Mobile use is extremely necessary and restricted; family members can only make calls of great importance, and these must be short. They are forced to develop strategies—extremely short calls and the use of *pinchazos,* or beeping—to keep in contact.[7]

Mobile Telephony in Mexico

The mobile telephony market in Mexico was initiated in 1987. The country was divided into nine regions, and two licences were issued for each of these regions. Telcel, a subsidiary of América Móvil, was granted a licence for each of the nine regions on the condition that it would not be the only service provider. Together with Telcel, which holds 78% of the Mexican mobile market share, the main carriers are Iusacell, in operation since the late 1980s; Telefónica Movistar, which entered the market in 1999; and Unefón, which began operations in early 2000.

Although market opening and technological innovation have contributed significantly to the mobile sector's development, a decisive role in its growth has been played by changes in pricing and regulatory strategies.[8] The introduction of the "calling-party-pays" system in 1997 and the prepaid model have had a considerable impact on the industry (Mariscal, 2007). Between 2001 and 2006, the mobile telephony sector in Mexico grew at an average annual rate of more than 20%. Mobile penetration first surpassed fixed-line penetration in 2000 and went on to double it in 2004, as can be seen in Figure 1. However, the increase in national mobile telephony penetration has been concentrated in a few of the country's states, such as the Distrito Federal, with 91 lines per 100 inhabitants, while in others, growth has been moderate. For example, Chiapas went from 2.4 lines per 100 inhabitants in 2000 to 31 in 2006, and the Estado de Mexico went from 3.7 to 19.5 (see Figure 2).[9]

7. Neither the studies mentioned in the literature nor the present study can claim to be nationally representative (see Appendix 1).
8. In 2003, the Mexican Federal Telecommunications Commission ordered the interconnection of the country's various mobile operators within the next 60 days, so that subscribers to different networks would be able to exchange short messages. The Commission also determined that this service drove up switched public traffic, making it subject to article 42 of the Federal Telecommunications Law, and proposed that companies adopt the "bill and keep" system. SMS traffic rose from 3.3 million messages a day before the adoption of the resolution to 38 million a day in 2005 (Mariscal & Rivera, 2006; Mariscal 2007).
9. In Mexico, there is no social policy to promote the use of mobile telephony. Rates are freely set by operators and merely need to be registered with the Secretariat of Communications and Transportation (SCT). The Federal Telecommunications Law only considers the regulation of rates when substantial market power is determined (articles 60 and 61 of the law). With regard to interconnection charges, these are directly negotiated between operators within a deadline of 60 days. The intervention of the regulator is only called for in the event that an agreement cannot be reached within the time established (article 42). Nor is there a universal access program for mobile telephony. In 2002, the Telecommunications Social Coverage Fund was established as a temporary universal access fund, financed solely with public money and with no contributions required from private operators. Its purpose is to finance specific projects, primarily involving public and residential telephony over networks with data transmission capacity.

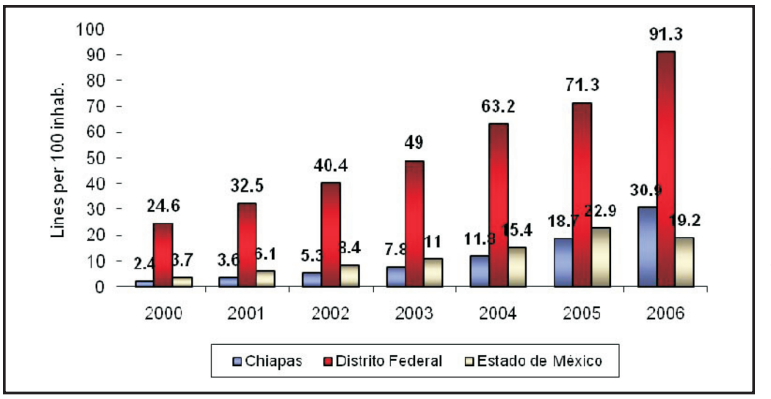

Figure 2. Mobile Teledensity 2000–2006.
Source: Telecom-CIDE, based on COFETEL (2006).

According to data from the 2006 National Household Income and Expenditure Survey (INEGI, 2006a), Mexican households devote an average of 4.8% of their total spending to communications, as compared to 3.3% in 2002. In the specific case of mobile telephony, according to the Banco de México (the Central Bank), in 2006, the almost 11 million households with a mobile phone spent an average of 362 pesos a month on this communication service. This implies an 18% increase over the average expenditure in 2004, according to data from the National Household Income and Expenditure Survey. For the country's poorest inhabitants, spending on mobile telephony represents almost 10% of their monthly income, whereas for middle class families, it represents 3.7% (Martínez, 2007).

Penetration, in terms of income groups, has evolved toward greater use of mobile telephony by low-income sectors. In 2003, only 9% of people in socioeconomic levels D and E were mobile users, but by 2005, this figure had reached 27% (see Table 1). In the meantime, mobile use has remained constant at 89% among the highest income sectors (Telecom-CIDE, 2006).

Research Methods

This research study forms part of a larger project entitled Mobile Opportunities: Poverty and Telephony Access in Latin America and the Caribbean, undertaken by the Regional Dialogue on the Information Society (DIRSI). As a fundamental component of the project, a survey on mobile telephony usage patterns was conducted in seven countries in Latin America and the Caribbean: Argentina, Brazil, Colombia, Jamaica, Mexico, Peru, and Trinidad and Tobago. The survey sought to assess the impact of mobile telephony access on low-income population sectors with regard to the following aspects: employment opportunities and income, relations with the government and social services, and the strengthening of social and family networks.

Low-income households were identified using existing geo-referenced data provided by INEGI, from which a probabilistic sample of urban households was drawn. Individual respondents were randomly selected from each household. The goal was to obtain a representative (and statistically independent) sample of low-income dwellers from urban areas at the national level. Fieldwork was conducted between April and May 2007.

In the case of Mexico, the two localities chosen for conducting the survey were the MZ of Mexico City and the MZ of Tuxtla Gutiérrez. Although both are urban areas, they were selected to reflect different socioeconomic and economic conditions. At one extreme, MZ of Mexico City, comprising the Distrito Federal and surrounding municipalities in the Estado de Mexico, is the most densely populated area in the country, and it also has the highest degree of economic and social development. At the other extreme, the MZ of Tuxtla Gutiérrez has a significantly smaller population, a lower degree of economic development, and little industry. The ranking of Chiapas on the Human Development Index is lower than that of Mexico City and the Estado de Mexico and, in fact, is the lowest in the country (see Table 2).

A total of 1,000 interviews were conducted: 600 in the MZ of Mexico City and 400 in the MZ of Tuxtla Gutiérrez. The survey respondents were selected based on the following criteria: (a) that they lived in an urban area and (b) that they were members of socioeconomic strata 1, 2, 3, and 4 (out of a total of 7, where 7 represents the best living conditions), in accordance with official measurements by INEGI (2006b). This approach was used to reach our target population. In addition to information on the

Table 1. Socioeconomic Level and Mobile Penetration in Mexico, 2005.[a]

	Level A/B	Level C+	Level C	Level D+	Level D	Level E
Percentage of the total population	10.8%		9.1%	23.8%	56.3%	
Postpaid plan	28%	12%	6%	6%	4%	
Prepaid plan	72%	88%	94%	94%	9%	
Total mobile users (as % of income group)	89%	75%	67%	42%	27%	

Source: Telecom-CIDE (2006).

[a] To have an instrument for comparison among its member agencies, the Mexican Association of Marketing and Public Opinion Research Agencies (AMAI) developed a socioeconomic classification system made up of six levels: A/B, C+, C, D+, D, and E, where A/B represents the highest level of income and E represents the lowest.

Table 2. Main Socioeconomic Indicators.[1]

Variable	Chiapas	Distrito Federal	Estado de México
Total population (2007)	4,293,459	8,720,916	14,007,495
State Contribution to National Gross Domestic Product (GDP) (%)	4.2	21.0	11.0
Food poverty (%)	47.0	5.4	14.3
Capabilities poverty (%)	55.9	10.3	22.4
Assets poverty (%)	75.7	31.8	49.9
Human Development Index (PNUD- Mexico)	0.718	0.884	0.787
Human Development Index national ranking	1	32	15

Source: Prepared by the authors, based on data from the National Council for the Evaluation of Social Development Policy (2007).

1. The Technical Committee for the Measurement of Poverty established three levels of poverty. Level 1 (food poverty) refers to people who cannot access a basic food basket, even when using all their available resources. Level 2 (capabilities poverty) refers to the population whose income does not reach the cost of a food basket plus the estimated expenditure required for health, clothing, housing, transportation, and education needs. Level 3 (assets poverty) is associated with the inability to obtain the value of the food basket plus the estimated general non-food required expenditure (SEDESOL, 2002). These poverty lines have a monthly income level of US$78, $95, and $156, respectively. Poverty lines were calculated with prices of May 2007 and converted to US$ using the monthly exchange rate average published in the Official Gazette (Source: CONEVAL (2007), based on INEGI (2006) and Banco de México).

use of mobile telephony and other means of communication, information on the socioeconomic conditions in the surveyed households was also gathered in all of the interviews.

In these 1,000 households, 53% live in the MZ of Mexico City, and 47% live in the MZ of Tuxtla Gutiérrez. 49% are men, and 51% are women. In terms of age ranges, the largest group is between 0 and 12 years of age, and the smallest group is over 51. 47% of the inhabitants of the homes which were visited work, 24% are engaged in household chores, and 18% study. The main occupational groups identified are trade, repair activities, processing, maintenance, and unclassified miscellaneous services.

One of the limitations faced by this type of fieldwork is the veracity of the information obtained, especially with regard to income. In some cases, the information provided does not reflect real levels of income, which is why it is necessary to turn to methods other than those based on monetary income to determine the socioeconomic level of survey respondents. One of these methods is the Unsatisfied Basic Needs Index (INBI). This index, widely used by governments and multilateral agencies in Latin America, is constructed on the basis of

Table 3. Components of the Unsatisfied Basic Needs Index.

	Dimension	Variable
Access to housing	a) Quality of housing b) Overcrowding	Construction materials used for the floor, walls, and roof a) Number of people in the household b) Number of rooms in the home
Access to sanitation services	a) Availability of drinking water b) Type of excreta disposal system	Source of water supply to the home a) Availability of sanitation service b) Excreta disposal system
Access to education	Attendance of school-aged children at an educational facility	a) Age of household members b) Attendance at an educational facility
Economic capacity	Probability of insufficient household income	a) Age of household members b) Highest educational level achieved c) Number of people in the household d) Type of activity

Source: Feres & Mancero (2001).

information gathered in surveys that is more reliable than income data. It is also simple to calculate, which thus makes it possible to easily determine different socioeconomic levels.

Unsatisfied Basic Needs Index (INBI)

The purpose of the INBI is to provide a direct method for identifying the poor, accounting for aspects not necessarily reflected in household income levels and taking advantage of the enormous potential for geographic disaggregation permitted by census information (Feres & Mancero, 2001). The sources of information most commonly used for this method are the population and housing censuses available in practically all countries in Latin America. The reason for this is that censuses are one of the few sources of information that make it possible to achieve the degree of geographic disaggregation needed for a poverty map to be useful in identifying spatially located needs (Ibid.).

The INBI is constructed on the basis of five indicators that evaluate four basic needs. Two of the indicators measure access to decent housing: the level of overcrowding among members of a household and the materials with which the home is constructed. The third indicator evaluates a household's sanitation conditions on the basis of the availability of an excreta disposal system. The fourth indicator measures access to education by reporting whether a school-aged member of the household is not attending an educational facility. Finally, the indicator that evaluates the household's economic capacity is constructed on the basis of a combination of the educational level of the head of the household and the ratio of income recipients to non-income recipients. Table 3 outlines the variables commonly used in Latin America to construct poverty maps.

If a household presents at least one of the four possible critical needs, it is assigned an INBI score of 1. If it presents no unsatisfied needs, the INBI is 0. Adding up the INBI scores of all households provides a type of "headcount index" that indicates how many households have at least one unsatisfied need and can, consequently, be considered poor.

Strategies

Strategies are all the conscious decisions made by a user to reduce the cost of mobile telephony. A decision is considered strategic when there are two or more options from which to choose.

The classification of strategies as short-term or long-term is based on the work of Zainudeen et al. (2006), who argue that both categories encompass conscious decisions, the main purposes of which are to minimize the costs associated with mobile telephone usage. The difference lies in the frequency with which such decisions are made. Short-term strategies involve decisions made on a daily basis,

and they include practices like beeping, or lost calls, and text messaging, or SMS.[10] On the other hand, long-term strategies involve overall decisions—that is, non-daily decisions—such as whether to purchase a mobile handset, whether to purchase a new or used handset, the type of payment plan chosen (prepaid or postpaid) and the use of different modes of telephony (mobile only, mobile and public, or mobile and fixed).[11] Using this same classification allows us to make comparisons among locations in different countries.

Long-term strategies are conscious decisions made by mobile users that deal primarily with access to mobile service and the acquisition of a mobile handset. These decisions are not made on a daily basis. They include the following: investment in a mobile connection, acquisition of a handset, shared usage, choice of a type of plan (prepaid or postpaid), and use of different modes of telephony (mobile only, mobile and public, or mobile and fixed).

Short-term strategies are conscious decisions made on a daily basis that involve taking advantage of local/regional GSM adaptation and mobile infrastructure to minimize costs. Under short-term strategies, there are two subcategories:

- **Not requiring maturity/skill:** These include using the mobile phone only for receiving calls, beeping, making calls only when rates are lower, and using a mobile phone rented on the street.
- **Requiring maturity/skills:** These include using text messages/SMS. This involves a daily practice, and users need a certain degree of maturity to send and receive messages. SMS messages have some particular characteristics, including the following: they cost less than a voice call; mobile operators market SMS differently from voice calls by including, for example, a certain number of text messages free of charge; and above all, SMS offers the potential for providing government and private-sector services to the income groups studied here. SMS usage is considered a cost-reduction strategy when users send a text message instead of making a call because they are conscious of the fact that it will be cheaper and thus reduce their expenditure.

Main Findings

Based on data drawn from the Mexican Population and Housing Census for the year 2000, we constructed the national-level INBI for both MZs covered by our study. It was determined that the proportion of poor households in both MZs was lower than the national average. This can be explained by the fact that both are urban areas, which means that practically all households have access to such basic services as water, electricity, and sewage systems, whereas the national average would include rural as well as urban populations.

The survey results revealed a low rate of mobile telephony usage: only 371 of the 1,000 individuals surveyed said that they had used a mobile phone during the three months prior to the interview. The percentage of mobile users was found to be higher in Tuxtla Gutiérrez (42%) than in Mexico City (32%). In this case, although there is no conclusive evidence to confirm it, it could be suggested that this is because residents of Mexico City have other communications options, especially fixed telephony, for which penetration rates have always been higher in the MZ of Mexico City than those in the MZ of Tuxtla Gutiérrez.

An analysis of mobile users according to their socioeconomic level revealed that households with fewer unsatisfied basic needs had larger percentages of users. As illustrated by Figure 3, the largest percentage of users (48.8%) was concentrated in non-poor households—those with no unsatisfied basic needs—while households with three or more unsatisfied needs account for only 5.9% of the total number of mobile users. This implies two things:

10. We believe that SMS has particular characteristics, such as the need for a certain degree of user maturity for its use and considerable unexploited potential, among others. These characteristics led us to devote a separate section to this strategy.

11. We consider this classification to be a clear means of presenting the different types of strategies. Nevertheless, it is not absolute, since a short-term strategy can become a long-term strategy and vice versa. For example, the decision to only receive calls once the user's credit has run out can be viewed as a short-term strategy, whereas the conscious decision to purchase a mobile phone only for receiving calls would be a long-term strategy. The use of different kinds of phones on a daily basis could be considered a short-term strategy, but it is considered a long-term strategy because it is related to overall decisions, such as whether to invest in a phone, to use a mobile or fixed line, etc.

Table 4. Households by Unsatisfied Basic Needs Index.

	National	MZ Mexico City	MZ Tuxtla Gutiérrez	MZ Mexico City (sample)	MZ Tuxtla Gutiérrez (sample)
Non-poor household	45.9%	60.2%	51.7%	42.5%	38%
	10,391,671	2,702,312	62,691	255	152
Household with 1 unsatisfied basic need	26.1%	26.8%	26.1%	34.7%	32.3%
	5,908,989	1,203,023	31,648	208	129
Household with 2 unsatisfied basic needs	15.7%	9.4%	13.5%	17.7%	19.8%
	3,554,449	421,955	16,370	106	79
Household with 3+ unsatisfied basic needs	12.3%	3.4%	8.5%	5.2%	10%
	2,784,696	152,622	10,307	31	40
Total	100%	100%	100%	100%	100%
	22,639,808	4,488,892	121,260	600	400

Source: Prepared by the authors, based on INEGI (2000) and DIRSI Mexico database (2007).

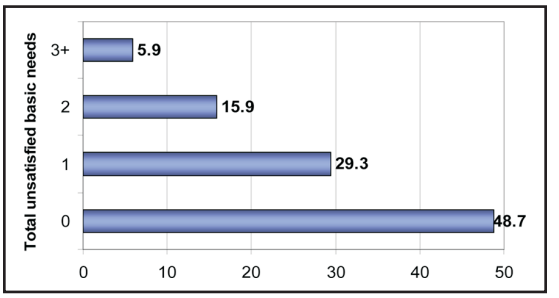

Figure 3. Mobile Users by INBI (%).

Source: Prepared by the authors based on DIRSI Mexico database (2007).

Note: Test for the differences between groups $\chi 2$ 0.95, 3 = 16, critical value 7.81; there is a statistically significant difference.

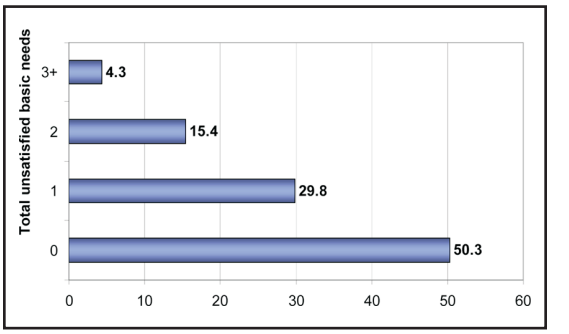

Figure 4. Mobile Owners by INBI (%).

Source: Prepared by the authors based on DIRSI Mexico database (2007).

Note: Test for the differences between groups $\chi 2$ 0.95, 3 = 7.34, critical value 7.81; there is not a statistically significant difference.

First, although mobile telephony has increased in importance, it is still not a basic good, and second, it remains a costly service for a significant part of the population.

Long-Term Strategies

The main long-term strategy involves the decision of whether to purchase a mobile phone, since it implies a major investment in view of the resources available to the groups addressed by this study. The data collected showed that 80% of mobile users owned their own phone (see Figure 4).

It is important to differentiate between the ways in which users obtained their handsets, since this indicates how valuable they consider being connected to be and what the level of affordability is. It was found that the majority of mobile users who own their own phone had purchased it (66%), while 31% had received it as a gift (see Figure 5).

Of those who had purchased a handset, 86% bought it new, and 14% bought it used. Reliable estimates of a second-hand phone market in Mexico are not available; however, the resale of used phones is a means of reducing entry costs and opening up opportunities to new users. In locations in India, the percentage of mobile telephony users from income groups similar to those under study here who purchased used handsets was around 33% (Zainudeen et al., 2006).

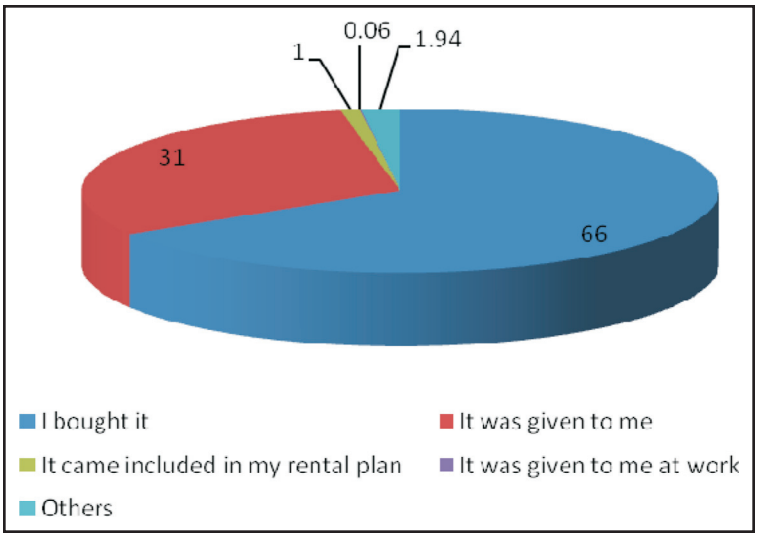

Figure 5. How Did You Acquire Your Mobile Phone? (%).
Source: Prepared by the authors based on DIRSI Mexico database (2007).

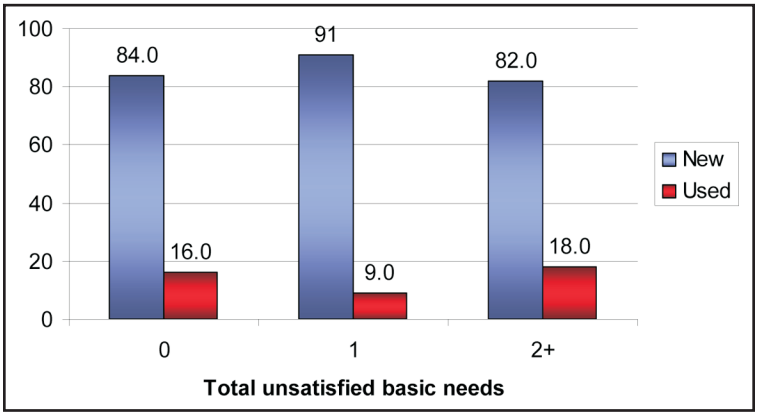

Figure 6. New or Used Handsets by INBI (%).
Source: Prepared by the authors based on DIRSI Mexico database (2007).
Note: Test for the differences between groups $\chi 2$ 0.95, 3 = 3.87, critical value 7.81; there is not a statistically significant difference.

In terms of socioeconomic level as measured through the INBI, the data revealed that, despite the cost implied by the initial investment, the majority of mobile users opt for purchasing a new handset regardless of the number of unsatisfied basic needs in their household (see Figure 6).[12]

Our data indicate that there are mobile phone users who do not own a mobile handset, but use the service nonetheless. Of the total number of mobile users, between 18% and 20% do not own the mobile phone they use. In 85% of cases, these non-owner users access to mobile service by borrowing a phone from a relative or friend. The rental of mobile phones in Mexico is minimal, at 4% (see Figure 7).

The data presented in Figure 8 reveal that mobile phones are mainly used on an individual basis (72%), and that there is little evidence of community use—borrowed or rented—as in locations in rural India and Bangladesh, where this practice seems to be common (Chakraborty, 2004; Bhagat, 2007).

Another long-term strategy involves the decision of the type of connection acquired. On one hand, there are postpaid plans, which are less costly than prepaid, but which also require such conditions as access to a credit card and the ability to pay a monthly fee whether the service is used or not. On the other hand, there is prepaid service, which allows users, once they have acquired a mobile handset and SIM, to purchase credit when they want. In addition, thanks to policies like "calling party pays," they can continue to receive calls even when their credit has run out.

The prepaid model has opened up access to mobile service for low-income groups. In Mexico, close to 92% of mobile telephony users are prepaid users. Our own data revealed a similar percentage. When questioning users about their reasons for choosing

12. Within our sample, the average price for a new mobile handset was US$111 and US$44 for a used device. Among those who had purchased a mobile phone, 32% had paid under US$50, 23.4% had paid between US$50 and US$100, and the rest had paid more than US$100, up to US$350. According to INEGI, while the monthly average total income for Mexican households in 2006 was approximately US$1,100, for the 10% of the households with the lowest income, the average monthly income was US$249.

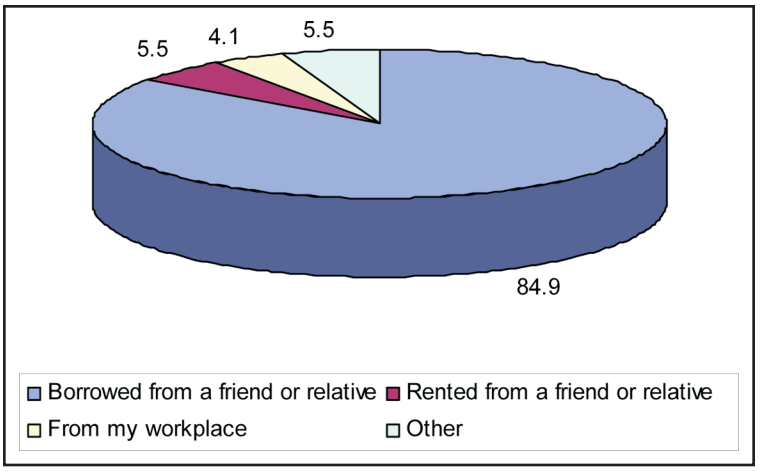

Figure 7. I Have Used a Mobile Phone . . . (%).

Source: Prepared by the authors based on DIRSI Mexico database (2007).

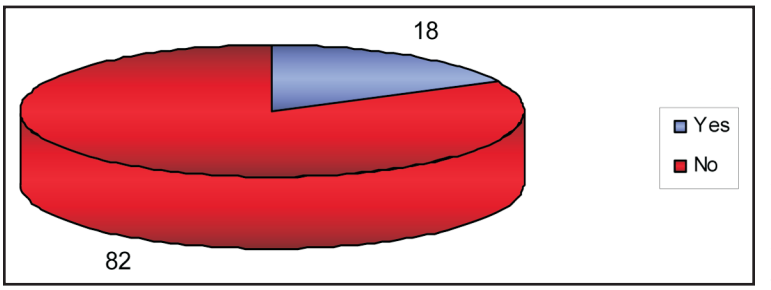

Figure 8. Has Someone Else Used Your Phone? (%).

Source: Prepared by the authors, based on DIRSI Mexico database (2007).

one plan over another, one might expect to hear different reasons for each one. However, both postpaid and prepaid users report that the main reason they chose this particular option is the greater ability to control spending, followed by the idea that it is less costly than the other option (see Figure 9).

The possibility of receiving calls on a mobile phone without the need for credit is tied to the use of other means of communication for remaining in contact. According to the data gathered, fixed telephony and public telephony are of particular importance for mobile users (see Figures 10 and 11).

The use of different types of telephony depends on the user's particular context. For instance, in rural areas where there are no fixed lines and people must travel long distances to reach a public telephone, mobile usage patterns will certainly differ from those ob-

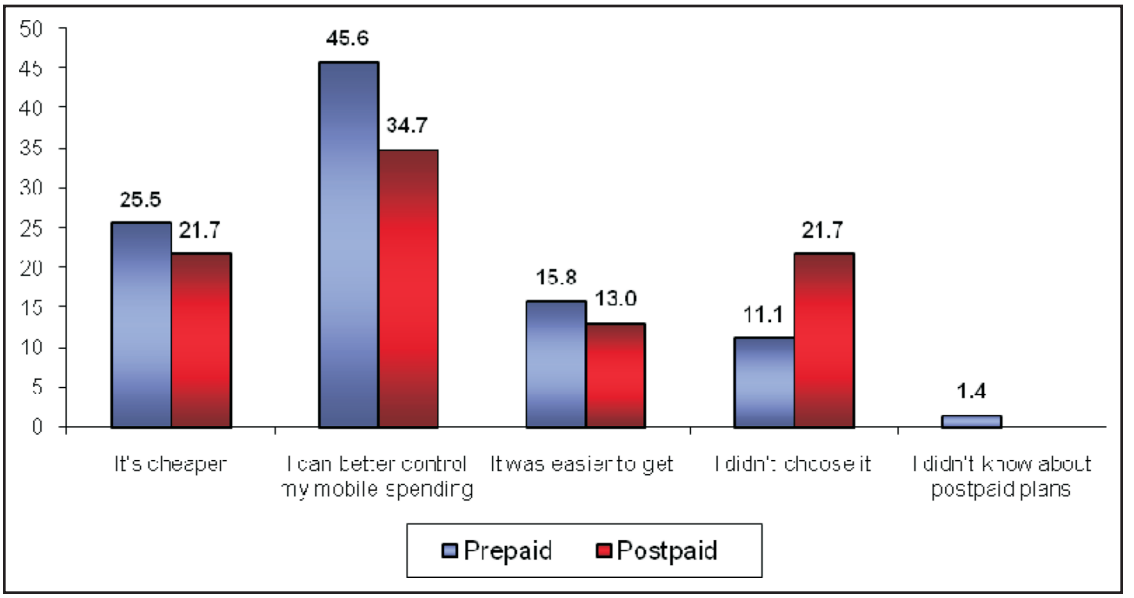

Figure 9. Reasons for Choosing a Rental Plan or Prepaid (%).

Source: Prepared by the authors, based on DIRSI Mexico database (2007).

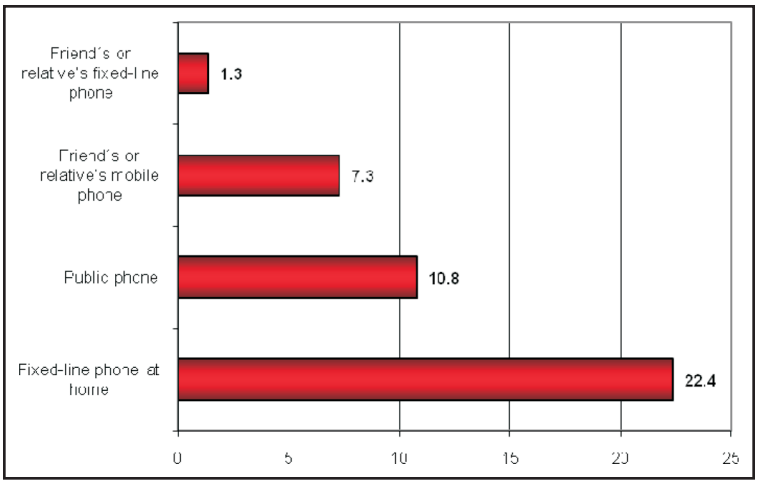

Figure 10. Use of Other Modes of Communication to Make Calls by Owners of Mobile Phones (as a % of the total number of owners).

Source: Prepared by the authors, based DIRSI Mexico database (2007).

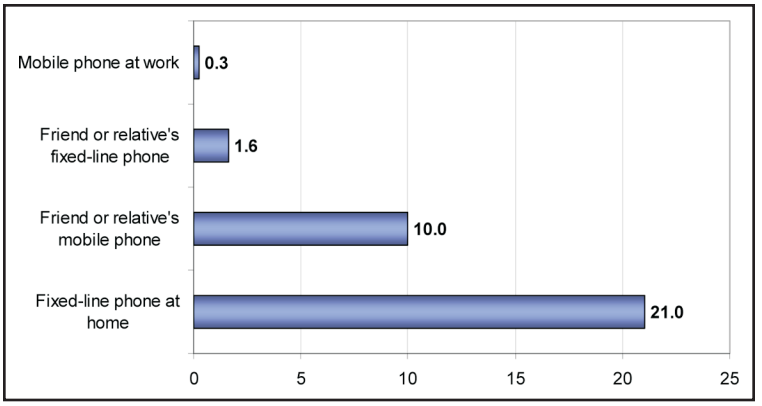

Figure 11. Use of Other Modes of Communication to Receive Calls by Owners of Mobile Phones (as a % of the total number of owners).

Source: Prepared by the authors, based on DIRSI Mexico database (2007).

served in areas where both fixed and public telephony services are easily accessible.

Short-Term Strategies

The main short-term strategies to minimize the costs of mobile telephony are using the phone only to receive calls, the use of SMS, and to a lesser extent, the practices of beeping and renting a mobile handset. A considerable percentage of mobile users are conscious of the fact that using these mechanisms saves money and, even more importantly, allows them to remain in contact (see Figure 12).

The mobile users who practice short-term strategies of any kind are primarily from households without unsatisfied basic needs. *As the number of unsatisfied needs increases, the practice of short-term cost-reduction strategies decreases (see Table 5).*

This could be explained by the few opportunities that the poorest users have to practice short-term strategies, mainly because, as shown earlier, they are often not the owners of the mobile phones they use (see Table 6). They also make few calls, and those they do make are considered to be of great importance. This pattern of behavior coincides with the results of the study by Zainudeen et al. (2006), which found that short-term strategies are only moderately practiced by very poor users, since they use phones that do not belong to them and their discretionary power to employ such strategies is highly limited. Not surprising, the main cost-reduction strategy used by non-owners is the use of a mobile phone rented on the street. When analyzing other variables—age, education, sex—we did not find a positive correlation.

The main strategy employed to reduce costs was the use of mobile phones only to receive calls (50%). This strategy is a consequence of the adoption of the "calling-party-pays" system, as a result of which, mobile users have access to communication even when their credit has run out.

The fact that incoming calls are free of charge and outgoing calls are costly might lead one to expect mobile phones to be used much more frequently to receive calls. Nevertheless, using an independent-samples test, we found that there is not a statistically significant difference between the two: 70% of users made calls; 85% used their mobile phones to receive calls.

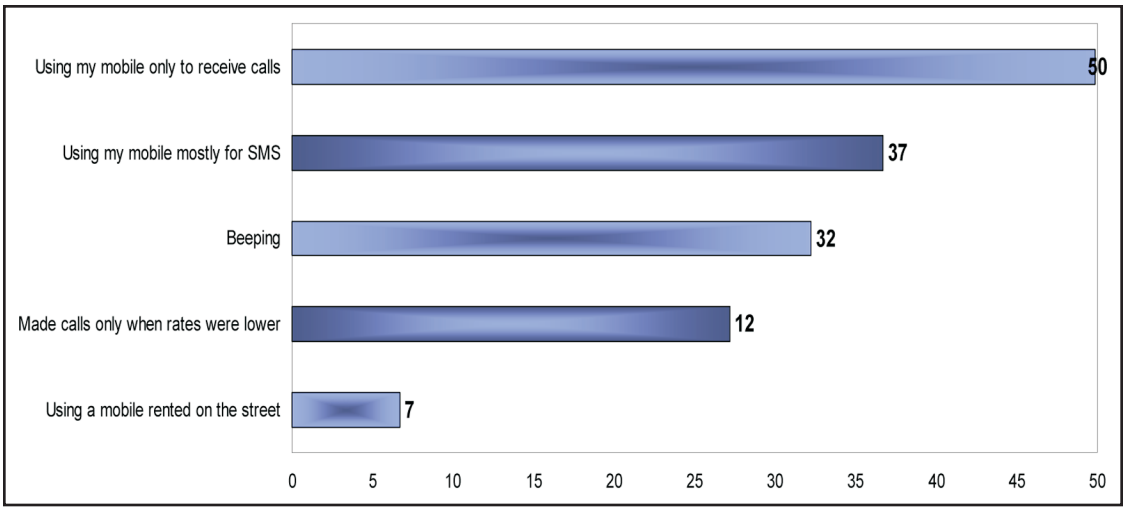

*Figure 12. Reduce Mobile Cost By . . . (%).**

Source: Prepared by the authors, based on DIRSI Mexico database (2007).

**More than one answer was allowed.*

Table 5. Cost-Reduction Strategies Used in Previous Month by INBI.

	Used missed calls/ beeping	Used phone only to receive calls	Made calls only when rates were lower	Used a mobile phone rented on the street
Non-poor household (no unsatisfied needs)	46.6	46.6	43.2	60.0
Household with 1 unsatisfied basic need	31.5	31.5	35.8	25.0
Household with 2 unsatisfied basic needs	15.1	15.1	17.3	10.0
Household with 3+ unsatisfied basic needs	6.8	6.8	3.7	5.0

Source: Prepared by the authors, based on DIRSI Mexico database (2007).
Note: Test for the differences between groups $\chi 2$ 0.95, 3 = 8.51, critical value 16.91; there is not a statistically significant difference.

Table 6. Cost-Reduction Strategies Used in Previous Month by Ownership.

	Used a mobile phone rented on the street	Used missed calls/ beeping	Used phone only to receive calls	Made calls only when rates were lower
Have mobile phone	95%	99.9%	99.9%	99.9%
Do not have mobile phone	5%	0.01%	0.01%	0.01%

Source: Prepared by the authors, based on DIRSI Mexico database (2007).

Table 7. Advantages of SMS by INBI.

	Cheaper than a voice call	Privacy
Non-poor household (no unsatisfied needs)	49.5	53.4
Household with 1 unsatisfied basic need	31.3	29.7
Household with 2 unsatisfied basic needs	15.9	14.4
Household with 3+ unsatisfied basic needs	3.3	2.5

Source: Prepared by the authors, based on DIRSI Mexico database (2007).

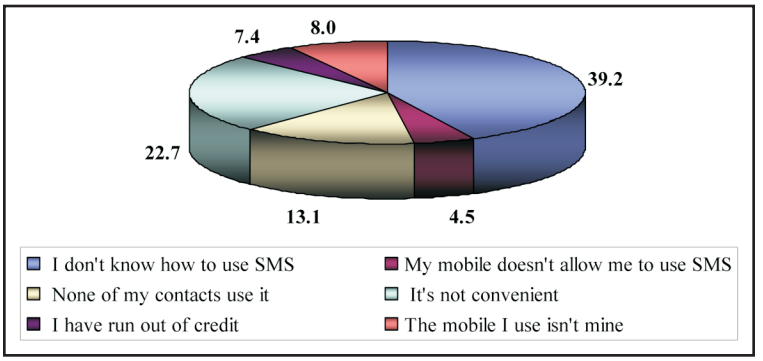

*Figure 13. What Is the Main Reason You Do not Send or Receive Text Messages (SMS)? (%).**

Source: Prepared by the authors, based on DIRSI Mexico database (2007).

**5% did not answer*

The Use of SMS

According to our survey findings, 52% of mobile users use SMS. Within this group, 93% of respondents said that one of the main advantages of text messages over voice calls is the lower price. It is important to note that the advantages of SMS over voice calls in terms of both reducing costs and greater privacy were primarily identified by users from households with no unsatisfied basic needs—in other words, non-poor households (see Table 7).

In locations in India and Sri Lanka, 40% of users surveyed used SMS, and 88% associated the practice with minimizing expenditure (Zainudeen et al., 2006). In Botswana, around 30% of mobile users used SMS with the aim of reducing costs (Gamos, 2003). It is important to remark that most of the text message users from communities of different regions—Africa, Asia, and Latin America—consider this practice to be a low-cost means of communication.

In 2007, almost half (48%) of the mobile phone users in Mexico did not use SMS. When asked about the main reason why they did not use this service, 39% said they did not know how, 22% said it was inconvenient (as compared to making a call), and 13% said none of their contacts used it (see Figure 13).

In view of the percentage of users who said they did not know how to use SMS, we analyzed the relationship between the use of this communication technique and the user's level of schooling. It was found that 70% of those who used SMS had a secondary school or university education. SMS use was also analyzed in relation to the length of time that

However, it is possible that users employ other strategies, like beeping and SMS, or go for longer times without making a call. For example, 30% of mobile phone users had not made a single call during the week prior to the survey. When analyzing the strategy of receiving calls only among variables such as education and age, we found no significant relation.

The use of missed calls or beeping is practiced by 32% of users to reduce costs, and it is less frequent in Mexico than in locations in Africa, where almost half of the users (45%) practice this strategy (Gamos, 2003). One possible explanation for this difference is the degree of maturity of users in terms of the skills developed in using mobile phones. More evidence from communities of India, Bangladesh, and Rwanda seems to indicate that this short-term strategy is widespread. It is also possible that this practice has become extremely common elsewhere because of particular characteristics of the region in question.

the respondents had been mobile phone users. The results showed that SMS users are evenly distributed among different degrees of mobile phone experience.

Those who do use SMS cite its lower cost as compared to calls as its main advantage. When analyzing the use of SMS among different variables, we find that education and a higher standard of living have a positive correlation.

Discussion and Conclusions

This document offers an exploratory view of the strategies practiced by low-income mobile phone users in Mexico. This study is the first step in identifying and understanding strategic behaviors similar to those of low-income users in other places of the developing world. It is important to continue with further qualitative research to better understand the needs, constraints, uses, and benefits perceived by low-income users and non-users. Taken together, the low number of mobile users found in our sample, the constraints on their incomes, the significant percentage of those who practice strategies to reduce costs, and the fact that there are users at the bottom of the pyramid who are not even able to practice cost reduction strategies reveal the need to think about who is receiving the benefits of technology.

With respect to long-term strategies, we find that low-income mobile users combine mobile use with household fixed telephony and, to a lesser extent, public telephony. The majority of mobile users acquire their own handsets, and ownership is only shared in a very small number of cases. It is possible, however, that in some cases, a mobile phone might serve as a family phone because there are no other communication options.

The use of prepaid service is often due to the fact that users in this income sector do not fulfil the credit requirements for a rental plan. Another reason for this practice is that low-income users prefer not to commit resources to a postpaid plan and, instead, choose to purchase credit for making calls only when their income is "sufficient."

An interesting finding is that, in general terms, it is possible to identify a relationship between a higher standard of living and the use of cost-reduction strategies, especially in the short term. When basic needs are covered, the practice of strategies is greater, and as the number of unsatisfied basic needs increases, the practice of strategies decreases. When we analyzed the different variables—education, age, length of use, ownership—the results were not significant. Users at the bottom of the pyramid do not seem to make as much use of cost reduction strategies as one might expect.

This is surprising, given that, on the one hand, the individuals surveyed are from lower socioeconomic levels and devote a large percentage of their limited incomes—up to 10%, according to official figures—to expenditure on telephony, while, on the other hand, they consider the service to be costly. There are various factors that could explain this situation. First, there are mobile users who do not own the phones they use, which means that their ability to practice some sort of short-term strategy is significantly limited. For example, as pointed out by Zainudeen et al. (2006), users who are not owners do not have a mobile phone at their disposal all of the time, but only when they are able to borrow or rent one. Another factor that limits the use of these strategies, for both those who own and those who do not own their own phone, is that the person to whom their relatively few calls are made may not have a mobile phone. In addition, the use of cost-reduction strategies is limited not only by lack of access to mobile telephony, but also by lack of access to other means of communication, like fixed and public telephony or the Internet (VoIP). The few calls such users make are considered very important.

It seems that a low level of education, membership in a household with unsatisfied basic needs, networking effects, and probably, the lack of operator incentives to promote SMS in Mexico are related to the low utilization of this service. Data services are crucial income earners for mobile operators in other countries. Mexican operators should be aware of the large untapped market at the bottom of the pyramid and consider innovative packages of SMS that specifically target the needs of low-income groups.

Since the next wave of mobile users will be in the developing world, the ICT industry and regulators should work together now to establish win-win strategies and innovative policies to facilitate higher penetration rates among the population at the bottom of the pyramid. With higher penetration rates, people will both have the ability to, and find it more useful to, use cost reduction strategies, and this will also encourage such users to take full advantage of all the possible services that mobiles can offer. ■

Appendix 1

Table A1. Studies of Cost-Reduction Strategies Used in Developing Communities.

Authors	Country	Location	Income level	Sample
Aminuzzaman (2005)	Bangladesh	Dhaka	University students	300 interviews
Zainudeen et al. (2006)	India & Sri Lanka	11 locations	Low-income communities	India: 2,199 (7 localities) Sri Lanka: 1,100 (4 localities)
Chakraborty (2004)	Bangladesh	Sitakund	Disadvantaged youths and adolescents	Field notes, in-depth interviews, group discussions, social maps, and issue-based participatory exercises
Donner (2007)	Rwanda	Kigali	University students small-business owners	15 in-depth interviews
Gamos (2003)	Botswana, Ghana, Uganda		Low-income communities	Ghana: 630 interviews Uganda: 520 Botswana: 630
Frost & Sullivan (2006)	Argentina, Brazil, Colombia, Mexico	Rural and semiurban communities	6% high-income communities 22% medium 35% medium-low 37% low	800 interviews
Angoitia & Ramirez (2008)	Mexico	ZM Ciudad de México, TG. Chiapas	Low-income communities	600: ZM Mexico City 400: TG Chiapas
Ureta (2008)	Chile	Santiago	Low-income families	20 in-depth interviews

Source: Prepared by the authors, based on Aminuzzaman, 2005; Chakraborty, 2004; Donner, 2007; Gamos, 2003; Angoitia & Ramirez, 2009; and Ureta, 2008.

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