July 2005

Global Diffusion of the Internet VII- Teledensity Growth Strategies for Latin America: The Case of Colombia and Ecuador

Scott McCoy
College of William and Mary, Scott.McCoy@business.wm.edu

Victor W. A. Mbarika
Southern University, victor@mbarika.com
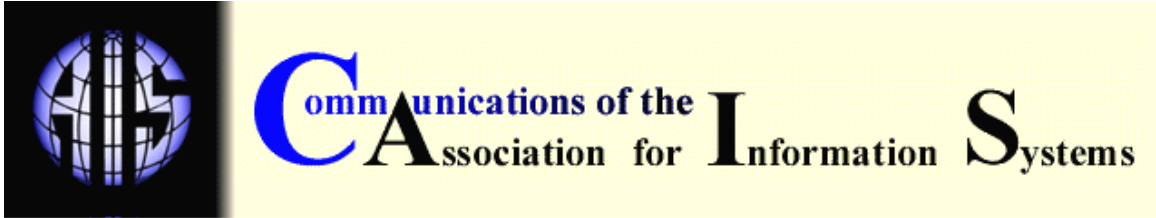
Follow this and additional works at: https://aisel.aisnet.org/cais

GLOBAL DIFFUSION OF THE INTERNET VII- TELEDENSITY GROWTH STRATEGIES FOR LATIN AMERICA: THE CASE OF COLOMBIA AND ECUADOR

Scott McCoy
College of William & Mary
scott.mccoy@business.wm.edu

Victor Mbarika
College of Business
Southern University and A&M College

ABSTRACT

The Internet in developing countries grew substantially in recent years. Given the large income disparities and low telephone penetration rates in most Latin American countries, only about 4% of the region's population can access the Internet. The International Telecommunication Union reports that teledensity (the number of telephone land-lines per 100 people) in Latin America is currently at about 10.8%. Prior research identified specific factors that hinder growth of teledensity in developing countries and specific strategies used to overcome such limitations. This study investigates Latin American telecommunication stakeholders' perspective of how these strategies can be used to address teledensity growth in the region. Survey participants (Latin America's telecommunications stakeholders) analyzed the strategies critically and modified, enhanced, or added new insights. Using appropriate statistical procedures we examined the telecommunications stakeholders' perceptions to find potential solutions the low teledensity problem. Qualitative comments to support the stakeholders' responses are reported, together with future research implications.

Keywords: telecommunications; teledensity; Latin America

I. INTRODUCTION

> "Viva Internet! Latin America is the fastest growing region in terms of Internet usage, at over 75% per year. However, it is still largely the domain of the top socio-economic quintile of the population." [Pegasus Research International, 2003]

Teledensity (number of main telephone lines for every one hundred inhabitants) is the paramount measure of a country's telecommunications infrastructure [Saunders et al, 1994; Gille, 1986; Mbarika, 2000]. Research shows a high correlation between a country's level of telecommunications infrastructure represented by teledensity and the level of economic power represented by the national per capita gross domestic product [Saunders et al.,1994]. Telecommunications technologies promote resource mobilization through improved division of labor and serve as an agent of development [Jussawalla, 1988]. Teledensity also provides the

base for important applications on the Internet, such as telemedicine, online education, and e-commerce. However, before the Internet can be used to its fullest potential in Latin America, teledensity must be improved.

Although information and communication technologies (ICT) are fundamental to their socio-economic development, developing countries were never in the position to exploit the full potentials of such technologies [Mbarika et al, 2002]. Previous research indicates that low teledensity in Latin America is the main bottleneck for ICT growth [Wellenius, 1984; Pegasus Research International, 2003; Hunt, 1997]. For example, in the beginning of 2002, Chile had 22 land lines per hundred [Appendix 1]. Chile's teledensity, although seemingly low, is roughly twenty percent higher than that of Brazil. In Paraguay and Bolivia telecommunications infrastructure is underdeveloped, with teledensity of 6 lines per 100 and 5.5 lines per 100 respectively. Appendix 1 shows basic telecommunications indicators for the Carribean and for Latin America as of December 31, 2001.

Prior research has identified specific factors that hinder growth of teledensity in developing countries and strategies to address such factors. In this study, we focus on Latin American stakeholders' perceptions of strategies to address the obstacles to teledensity growth in Latin America. Colombia and Ecuador were chosen because of their current state of telecommunications reform. We felt it was important to obtain input from stakeholders in two different contexts, one in which reform made progress (Columbia) and one in which reform just started (Ecuador). Countries in this area can learn a great deal from the experience of what has happened in Colombia and what is starting to happen in Ecuador.

Colombia's population is approximately 42 million. Because of the competitive market and the entrance of private companies in the local telephony market, it has a more modern telephone system than other countries in Latin America. The government is supportive of the telecommunications industry and promotes the Internet.

Ecuador, on the other hand, is a much smaller country with a population of 13 million. The telephone industry is underdeveloped, but is expanding [CIA, 2004]. The country's fixed-line market was liberalized in 2002, but competition developed slowly. Ecuador's teledensity is low, with little or no telephone coverage in many areas. However, the country is attempting to improve the industry.

Obstacles that account for the low levels of teledensity in these countries include: economic, financial, technological, managerial, organizational, policy, political, and geographical factors [Bernt and Weiss, 1993; Mbarika, 2000; Mbarika et al., 2002]. These obstacles are outlined in Section II. We then review the strategies used to overcome these obstacles to teledensity growth in developing countries (Section III). These strategies fall into four categories:

- Organizational/Policy,
- Technology,
- Finance, and
- Geography.

We then investigate Latin American telecommunications stakeholders' perspectives on the major strategies for overcoming the obstacles to teledensity growth (Sections IV through X) . We present the research objectives and outline the different groups of telecommunications stakeholders (Section IV), our research questions (Section V), and methodology (Section VI). We discuss the stakeholders' perspectives on the obstacles that have been identified in the literature. Data collection, analysis, and discussion of results are presented in Sections VII and VIII. We conclude with implications and future research opportunities related to this study (Section IX).

II. OBSTACLES TO GROWTH OF TELEDENSITY IN LATIN AMERICA

To identify the obstacles to growth of teledensity in Latin America, we borrow from the Bernt and Weiss [1993] framework, which groups international telecommunications issues into four categories: organizational, technological, financial, and geographical.

- Organizational issues include governmental monopoly versus competition, deregulation, and privatization.
- Technological issues refer to the purchase and maintenance of telecommunications equipment, including personal computers.
- Financial issues include availability of appropriate funding needed to develop a country's telecommunications infrastructure.
- Geographical issues concern universal service policies that involve the provision of telecommunications infrastructure to urban and rural areas within a country, and regional cooperation among groups of countries.

Although we use the Bernt and Weiss framework, we place teledensity diffusion at the core. This approach is possible because teledensity and telecommunications infrastructure are highly correlated [Gille, 1986; Saunders, et al., 1994]. Figure 1 presents a modified version of the Bernt and Weiss framework. The model shows the four major obstacles that hinder the growth of teledensity in Latin America.
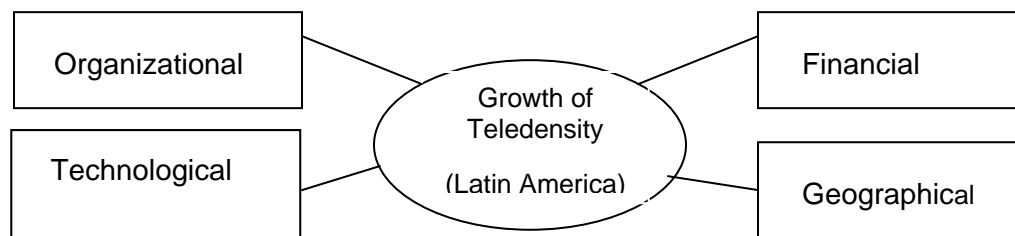
(modified from Bernt and Weiss, 1993)

Figure 1: Framework for Growth of Teledensity

III. STRATEGIES TO OVERCOME TELEDENISTY PROBLEMS IN LATIN AMERICA

Against this background of obstacles, Latin American telecommunications stakeholders engaged in the Herculean task of developing strategies that would ensure that the telecommunications industry plays the expected catalytic role in their countries' national development. This task generated debates over which approaches would ensure that the telecommunications sector impacts the development process positively.

We now turn to a brief review of strategies that have been used to overcome low teledensity in developing countries (See Mbarika [2001] for a complete review).

Organizational/Policy-Oriented Strategies identify the best level of privatization for the telecommunications industry. One option is to turn the telecommunications operator into an independent company with complete autonomy and encourage competition among the telecommunications operators. A second option is a non-governmental regulatory agency which controls the telecommunications industry and sets standards within the industry. A final option is to establish a governmental regulatory body to control the telecommunications industry and set standards within the telecommunications industry.

Technological-Oriented Strategies seek the most appropriate level of domestically developed technology and trained personnel. One option is for the telecommunication industry to be self-sufficient. In this option, Latin American countries would review the possibilities for local or regional manufacture of telecommunications equipment, and train local telecommunications staff.

A second option is for the Latin American telecommunications industry to rely on a foreign alliance. In this option, Latin American countries would set up long-term contracts to buy new knowledge and production capability from developed countries (i.e. joint ventures) through the acquisition of equipment and personnel. A final option is for the Latin American telecommunications industry to rely completely on foreign interventions to address their telecommunications problems. Latin American countries would solicit help from developed countries to build and install their telecommunications equipment. They would hire foreign experts to perform routine maintenance of existing equipment.

Finance-oriented Strategies look at the funding options for the telecommunications industry in Latin America. One option is to generate funding domestically. Some possibilities under this option are to devote a percent of GNP to telecommunications investment and provide government subsidies to the local telecommunications industry. A second option is to look toward foreign-generated funding by obtaining development assistance from other countries and international agencies. The final option is to rely on private sector investment. This option would include reorganizing the telecommunications sector for direct private investment by both domestic and foreign investors.

Geographical-oriented strategies look at geographic-specific options for improving the teledensity in rural areas. The first option is to use wireless communications with ubiquitous coverage, such as mobile satellite services and fixed/semi-fixed cellular networks. A second option focuses on encouraging telecommunications service carriers to make investments in rural areas by reducing loan requirements, lowering taxes, and easing the requirements to register businesses. This option also includes mandating that new service providers serve both urban and rural areas, using the resources of urban areas to subsidize rural areas. The final option is to encourage private investors to establish pay phone services such as public telephone booths, as well as to establish telecentres or shared community access to promote the use of telephone services and other forms of shared access, which could in turn promote the use of advanced services such as the Internet.

The strategies outlined above have been used individually and in combination to overcome obstacles to teledensity growth in developing countries. This paper focuses on Latin American stakeholders' perceptions of these strategies.

IV. RESEARCH OBJECTIVES

This study examines Latin American stakeholders' perception of the strategies for mitigating the obstacles to teledensity growth. The literature shows that the strategies outlined in Section III were used to enhance teledensity growth in other developing countries. Techniques for matching specific strategies to identified obstacles are drawn from the literature [Mbarika 2000; Mbarika et al., 2002].

The telecommunications stakeholders can be divided into two groups: government stakeholders (GSH) and non-government stakeholders (NGSH). Each group contains sub-groups (Table 1). We want to find out if there are differences between these two groups of stakeholders in their perceptions of the strategies.

Table 1: Stakeholder Classifications

Governmental Stakeholders (GSH)	Non-Governmental Stakeholders (NGSH)
Government Entities	Telecommunications Operators (non-government controlled
Parastatals ("for-profit" auxiliary government-controlled pseudo corporations	Academia, Research Centers, and IT experts
Telecommunications Operators (government controlled)	International/Regional private organizations

Adapted from UN classifications [UN, 2000]

We compare the stakeholders groups because the academic and practitioner literature show that these groups suggest different strategies to solve low teledensity problems. To illustrate differences between the stakeholders, consider the example of regulation.

Government stakeholders and parastatals often advocate telecommunications operation to be a government-owned-and-controlled monopoly "for reasons of national security." Most non-government stakeholders believe that the telecommunications industry should be privatized and the regulations liberalized to allow for free entry into the market, which would promote competition and benefit the economy [Mbarika et al., 2000]. The non-government stakeholders advocate the United States model where private entities own the telephone networks, and the government acts only as the regulator. Academicians (as a sub-group of stakeholders) point to the importance of universal services so that the teledensity gap between urban rural areas can be closed, providing rural areas with communications services [Saunders, 1982].

These differences in stakeholders' views are fundamental to the scope to our study. In fact, both of our research questions are based on these differences. We seek to explain some of the Latin American stakeholders' perspectives in this study and focus on where stakeholders agree, thus identifying a common base and set of strategies to address the low teledensity problems within the Latin American region. If Latin American telecommunications industry stakeholders can understand how the different stakeholder groups are similar and different in their views, they will have the ability to remove obstacles to teledensity growth.

V. RESEARCH QUESTIONS

To investigate Latin American telecommunications stakeholders' perspectives of strategies that could be used to address the constraints to teledensity growth we developed two main research questions.

Research Question 1:

What are the Latin American telecommunications stakeholders' (government and non-government) perspectives on the major strategies for overcoming obstacles to teledensity growth documented in the literature?

Research Question 2

Do Latin American governmental (GSH) and non-governmental telecommunications stakeholders (NGSH) perceive the major strategies for addressing the obstacles to teledensity growth differently?

VI. METHODOLOGY

We used a validated survey from two previous studies [Mbarika 2000; Mbarika et al., 2002] for our data collection. These studies examined stakeholders' perceptions of strategies to improve the teledensity infrastructures of Africa's least developed countries (LDCs). We solicited survey participants to analyze the strategies, propose new ones, and to modify or add new insights to the strategies. Twenty-six participants were chosen from Colombia (6 were governmental stakeholders and 20 were non-governmental stakeholders), and 66 were from Ecuador (19 were governmental stakeholders and 47 were non-governmental) for a total of 92 respondents (25 being governmental stakeholders and 67 being non-governmental stakeholders). The previously used instrument was translated and then back translated by native speakers to ensure no loss of meaning. The questionnaire is shown in Appendix II.

To examine the first research question, the survey participants gave their perception of the criticality of each category of strategy for promoting teledensity growth, using a Likert scale from 1 (strongly disagree) to 7 (strongly agree). A rank order of each category of strategies was evaluated using Friedman's Test [Kerlinger, 1986]. This test is a more direct evaluation of the investigator's research question or hypothesis that involves the association of the ranks. The

Friedman's Test tests the null hypothesis that k related variables or factors come from the same population. For each case, the k variables are ranked from 1 to k, and the test statistic is based on these ranks. Each case is a judge or rater, and each variable is an item or person being judged. In our study, each stakeholder rated each factor (strategy) and its associated sub-factors. The null hypothesis states that there is no difference in mean ranks (the sum of ranks divided by the number of cases) of the stakeholders' perceptions of strategy effectiveness, while the alternative hypothesis states that a difference exists in the mean ranks of the stakeholders' perceptions.

To address research question 2, we computed an analysis of variance (ANOVA) for each of the sub-factors or sub-strategies in the study to examine differences in perception (of the suggested strategies) between the GSHs and NGSHs. To avoid introducing too many factors for which we do not have enough supporting knowledge, we included only strategies and sub-strategies that are documented previously in the literature.

Respondents ranked the strategies using both paper and internet-based surveys. Internet-based surveys offer significant benefits if certain conditions, such as large sample size and IT penetration, are met [Kueng and Wettstein, 1999]. In an empirical study of academic reference librarians, Matz [1999] found no sampling bias or mode effects in tests of the respondents' demographics and the content of responses. Response rates to web surveys were just as high as traditional survey methods; and while responses were gathered more quickly, the paper instrument was not far behind. E-mail notices were more efficient for promoting the web-based survey than paper-based notices. In a recent study conducted among a university population, Western Wats found Internet research to be as successful as more traditional forms of data collection [Wygant and Lindorf, 2000]. These studies confirmed the findings that significant differences in mean scores between paper-based and web-based questionnaires do not exist. [Kantor, 1991; Rosenfeld et al., 1989]. Finally, having the surveys collected by the web prevented errors in data entry that can be introduced when paper surveys are used [McCoy and Marks, 2001]. Being telecommunications stakeholders in Latin America, most of the respondents had access to the Internet.

VII. RESULTS

Of the 175 questionnaires sent to individuals, 92 responses were returned (52.5% response rate). Twenty-five of the 92 respondents were governmental stakeholders and 67 were non-governmental stakeholders. A scaled value for each main factor was computed by averaging the responses across the sub-factors that best represent the main factor (or strategy).

We now examine respondent perceptions of each of the four main teledensity-promoting strategies outlined in Section II :

- Organizational/Policy-Oriented strategy
- Technological-Oriented strategy
- Financial-Oriented strategy
- Geographical-Oriented strategy.

ORGANIZATIONAL/POLICY-ORIENTED STRATEGY

Table 2 describes the three factors under the Organizational/Policy-Oriented strategy. For each factor, we calculated the mean values and standard deviations for each factor. Table 3 shows the rank orders of the mean scores for the three factors.

Table 2. Factors Under Organizational/Policy-Oriented Strategy

Factor	Description
Privatization / Free Enterprise	Turn the telecommunications operator into an independent company with complete autonomy. Sell shares of the telecommunications operator to the public. Encourage competition among the telecommunications operators.
Regulation—Non-Governmental	Establish an impartial, *non-governmental* regulatory body to control the telecommunications industry. Establish an impartial, *non-governmental* regulatory body to set and uphold standards within the telecommunications industry.
Regulation—Governmental	Establish an impartial, *governmental* regulatory body to control the telecommunications industry Establish an impartial, *governmental* regulatory body to set and uphold standards within the telecommunications industry.

Table 3. Rank Order[1] of Means for Organizational/Policy-Oriented Strategy

Rank	Mean Rank	Mean	Std. Deviation	Factor
1	2.10	5.64	1.10	Privatization/Free Enterprise
2	2.17	5.62	1.56	Regulation--Non-Governmental
3	1.73	4.26	2.21	Regulation--governmental

x^2 = 10.68; d.f. = 2; Significance < .005

The results of the rank order of the means showed that the privatization/free enterprise factor was ranked the highest, followed by the regulation—non-governmental factor. Respondents ranked the regulation-governmental factor lowest.

Similarities and Differences of Perceptions of Organizational/Policy-Oriented Strategies

To see if there were any statistically significant differences between the perceptions of governmental stakeholders and of non-governmental stakeholders, we carried out a univariate analysis of variance (ANOVA). The analysis shown in Table 4 found significant differences in stakeholders' perceptions of the "privatization / free enterprise" factor. The governmental stakeholders felt the telecommunications industry should be government controlled, and the non-governmental stakeholders felt it should be privatized. There were no differences in perceptions across GSH and NGSH for the other two organizational/policy strategies.

---

[1]The test statistic for the Friedman's test is a Chi-square (x^2) with (a-1) degrees of freedom (d.f.), where 'a' is the number of repeated measures. When the p-value (Significance) for this test is small (usually <0.05) you have evidence to reject the null hypothesis. Please note that the rank order does not necessarily follow the mean rank from highest to lowest. The rankings listed are in the correct order.

Table 4. ANOVA Results for Organizational/Policy-Oriented Strategy

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.49	1	5.49	4.75	.032
Intercept	2214.68	1	2214.68	1917.11	.000
Governmental/ Non-Govern-mental Stakeholder	5.49	1	5.49	4.75	.032*
Error	93.57	81	1.15		
Total	2741.67	83			

*P < 0.05; **p < 0.01; ***p < 0.001
(Dependent Variable: Privatization / Free Enterprise)

TECHNOLOGICAL-ORIENTED STRATEGY

Table 5 describes the three factors under the Technological-Oriented strategy. Table 6 shows the rank orders of the mean scores for the three factors.

Table 5: Descriptions of Factors Under Technological-Oriented Strategy

Factor	Description
Self-Sufficiency	Latin American countries should review the possibilities for local or regional manufacture of telecommunications equipment.
	Operators and manufacturers should enhance the training opportunities they offer to telecommunications staff of Latin American countries.
	Latin American countries should be trained to carry out monthly routine maintenance of already existing equipment.
Latin American Foreign Alliance	Latin American countries, with assistance of funding organizations, should set up long-term contracts to buy new knowledge from developed countries (i.e. advocate for joint ventures).
	Development organizations should conduct seminars to improve the qualifications of experts of Latin American countries.
Total Foreign Dependency	Latin American countries should solicit help from developed countries to build and install their telecommunications equipment.
	When purchasing equipment from foreign countries, Latin American countries should ensure that the contract includes commitments on the supply of spare parts and post-installation review.
	Latin American countries should hire foreign experts to perform thorough routine maintenance of already existing equipment.

Table 6. Rank Order of Means for Technological-Oriented Strategy

Rank	Mean Rank	Mean	Std. Deviation	Factor
1	2.12	6.04	0.95	Self-Sufficiency
2	2.29	6.38	0.84	Latin American / Foreign Alliance
3	1.39	5.12	1.19	Total Foreign Dependency

x^2 = 59.02; d.f. = 2; Significance = .000[++]

The Friedman test showed that the self-sufficiency was ranked highest, followed by the Latin American / foreign alliance factor. Respondents ranked total foreign dependency lowest.

A univariate analysis of variance (ANOVA) found no significant differences between governmental and non-governmental stakeholders' perceptions of any factors under the Technological-Oriented strategy (Appendix III).

FINANCIAL-ORIENTED STRATEGY

Table 7 describes the three factors under the Financial-Oriented strategy. Table 8 shows the rank orders of the mean scores for the three factors.

Table 7. Descriptions of Factors Under Financial-Oriented Strategy

Factor	Description
Domestic-Generated Funding	Devote 1 to 2 percent of GNP to telecommunications investment. Latin American governments should subsidize the local telecommunications industry in order to expand their turnover and employment. To save cost of equipment purchase, Latin American countries should consider pooling their purchases of commonly used equipment including terminals and components. Encourage growth in the service sector (tourism, transportation, etc), which will be a major source of income that can in turn increase the provision for more phones.
Foreign-Generated Funding	Countries and international agencies with development assistance programs should give higher priority to growth of teledensity in Latin American countries. Funding institutions must ease conditions to grant loans for the purpose of establishing basic telecommunications infrastructure in Latin American countries.
Private Sector Investment	Encourage private investments through the reorganization of the sector and by using policy to direct investment into the sector. Encourage the participation of foreign private investors in funding directed towards growth of teledensity.

Table 8. Rank Order of Means for Financial-Oriented Strategy

Rank	Mean Rank	Mean	Std. Deviation	Factor
1	1.68	5.43	1.13	Domestic-Generated Funding
2	2.00	5.88	0.99	Foreign-Generated Funding
3	2.32	6.28	0.84	Private Sector Investment

x^2 = 20.25; d.f. = 2; Significance = .000[++]

The results of the rank order of the means show the domestic-generated funding factor was ranked the highest, followed by the foreign-generated funding factor. Respondents ranked private sector investment the lowest.

A univariate analysis of variance (ANOVA) found no significant differences between governmental and non-governmental stakeholders' perceptions of any factors under the Financial-Oriented strategy (Appendix III).

GEOGRAPHICAL-ORIENTED STRATEGY

Table 9 describes the three factors under the Geographical-Oriented strategy. Table 10 shows the rank orders of the mean scores for the three factors.

Table 9. Factors under Geographical-Oriented Strategy

Factor	Description
Wireless Communication	Mobile satellite services and fixed cellular networks should be installed. Use satellites to provide telecommunications in Latin American countries due to the ubiquitous coverage offered by satellite technology. Use semi-fixed analog mobile phone cells placed in communities without telecommunications along with cheap handsets and a VSAT link to regional hubs.
Rural Development	Telecommunications service carriers in rural areas should be provided easy loan requirements, lower taxes, and ease to register such businesses. Mandate that new service providers serve both urban and rural areas, using resources of urban areas to subsidize rural areas.
Public Telecommunications Access	Encourage private investors to establish pay phone services such as public telephone booths. Encourage private investors to establish telecentres or shared community access in order to promote use of telephone services and other forms of shared access, which could in turn promote use of advanced services such as the Internet.

Table 10. Rank Order of Means for Geographical-Oriented Strategy

Rank	Mean Rank	Mean	Std. Deviation	Factor
1	2.05	6.26	1.11	Wireless Communication
2	1.18	6.02	1.34	Rural Development
3	2.14	6.34	1.49	Public Telecommunications Access

x^2 = 7.04; d.f. = 2; Significance = .030

The rank order of the means showed the wireless communication factor was ranked the highest, followed by the rural development factor. Respondents ranked public telecommunications access the lowest.

A univariate analysis of variance (ANOVA) found no significant differences between governmental and non-governmental stakeholders' perceptions of any factors under the Geographical-Oriented strategy (See Appendix III).

VIII. DISCUSSION OF RESULTS

ORGANIZATIONAL/POLICY-ORIENTED STRATEGIES

Latin American Stakeholders ranked the "Privatization/Free Enterprise" strategy highest:

In ranking the privatization/free enterprise factor highest, the stakeholders are saying that the telecommunications operator should be turned into an independent company with complete autonomy, and that shares of the telecommunications operator should be sold to the public. Furthermore, the stakeholders believe that Latin American countries should encourage competition among the telecommunications operators as a major step to removing the organizational/policy-oriented obstacles. Littlechild [1978] stated that private ownership was positively correlated to the telephone penetration rate.

Table 11 shows that teledensity significantly increased in Argentina, Chile, Mexico, and Malaysia after privatization. The data is augmented to cover the years 1982 through 2000.

Table 11. Teledensity Statistics for Argentina, Chile, Mexico, and Malaysia

Year	Argentina	Chile	Mexico	Malaysia
1982	8.2	3.5	4.6	4.7
1983	7.7	3.7	4.8	5.6
1984	8.7	4.0	5.0	6.1
1985	9.0	4.4	5.1	6.5
1986	9.3	4.5	5.1	6.8
1987	9.6	4.6	5.3	7.4
1988	10.1	**4.9**	5.8	8.0
1989	10.4	5.0	6.5	8.9
1990	**9.5**	6.5	**6.9**	**9.9**
1991	9.7	7.9	7.5	11.1
1992	11.1	9.4	8.4	12.5
1993	12.1	11.0	9.2	14.6
1994	14.1	11.0	9.4	16.6
1995	16.1	13.2	9.3	17.8
1996	18.1	14.9	9.7	19.5
1997	19.7	18.4	10.4	20.2
1998	20.8	20.5	11.2	20.3
1999	20.7	20.7	12.5	19.9
2000	22.02	22.3	13.7	19.6

Source: ITU
Note: The teledensity in the year of privatization is shaded and shown in bold.

Privatization is a major factor under the organizational/policy-oriented strategy. Some Latin American stakeholders commented on the importance of privatization:

> *"Definitively an increase in competition would make companies improve the quality of their services, but it is also important to have an entity of telecom regulation that assures the compatibility between different technologies, but doesn't participate in the definition of telecom standards because this couldn't be a transparent act and could benefit personal interests."*

> *"…[C]ompetition between the operators of telecommunications will oblige them to enhance the quality of service and increase the coverage. At the same time it is important to have regulatory entities that define standards in order to control quality of service and legal competition."*

Although the stakeholders ranked Privatization/Free Enterprise strategy highest, the ANOVA results show that stakeholders disagreed on this strategy. Some of the stakeholders had reservations that, among other drawbacks, complete privatization could lead to uncontrolled monopolies. Non-governmental stakeholders articulate these reservations:

> *"I agree with the implementation of private telecommunication companies, but it depends on the way that they are managed, because I consider that this to be a blade with two edges."*

> *"In some way it is crucial that the entities of telecom regulation are not dependent of the government. On the other hand, the government needs to have some representatives in these entities with a voice and a vote."*

Respondents ranked non-governmental regulation second and governmental regulation lowest. Some stakeholders indicated that privatization should go hand-in-hand with non-governmental regulation, which involves establishing impartial, non-governmental regulatory bodies to control the telecommunications industry and to set and uphold standards within the telecommunications industry. Such a move may reduce the level of corruption that already exists within the (governmental) regulatory sector that currently exists in many Latin American countries [Mbarika et al., 2002]. One Latin American stakeholder voiced this concern:

> *"It is necessary to have an impartial regulatory organization that doesn't work for the government, because we all know that our country has a high level of corruption. There shouldn't be any place for politics inside this organization in order to avoid corruption."*

TECHNOLOGICAL-ORIENTED STRATEGIES

Latin American stakeholders ranked the "Self-Sufficiency" factor highest.

In ranking self-sufficiency and Latin American / foreign alliance highest, the stakeholders are saying that both factors are important technological-oriented strategies. Under a self-sufficiency strategy, Latin American countries should review the possibilities for local or regional manufacture of telecommunications equipment, and operators and manufacturers should improve the training opportunities they offer to telecommunications staff of countries within the region. Local experts should be trained to carry out routine maintenance of already existing equipment.

One of the strategies that has accelerated growth of teledensity in many progressive developing countries is the promotion of local industries [Mbarika, 2000]. This strategy could be a step to reducing Latin American countries' dependence on foreign countries. Stakeholders from Columbia and Ecuador commented:

> *"The Latin American people have the knowledge of developed countries. The only disadvantage is the knowledge of the latest technologies. This could be solved with continuing education. Besides this, with appropriate financing, external or not, we could create our own technologies."*

> *"Ecuador has highly qualified human resources that need to be supported with studies and training overseas. In this way, we could avoid a total dependency on external sources and just work with them as supporting entities."*

While they favored self-sufficiency, respondents also valued Latin American/foreign alliances. With assistance of funding organizations, Latin American countries should advocate for joint ventures and set up long-term contracts to buy new knowledge from developed countries. Development organizations should conduct seminars to improve the qualifications of experts of Latin American countries. With strong training programs for locals, such an alliance could be the basis of a (long term) transition to greater self-sufficiency with little dependence on foreign countries. Some stakeholders from Columbia and Ecuador commented:

> *"In Latin-American countries there are sufficient human resources to handle activities that are relatively easy and in some cases are routine such as the maintenance. However, it is important to maintain permanent contracts (agreements) with the providers in order to instruct the people. In countries like Colombia, there are many people that have the capacity to do this kind of job and they are unemployed!"*

> *"…In contracts, there should be training and instruction of employees, through graduate courses and programs overseas. This would also create more jobs for our people."*

FINANCIAL-ORIENTED STRATEGY

Latin American stakeholders ranked the "domestic-generated funding" factor highest:

In ranking the domestic-generated funding highest, the stakeholders strongly favor devoting a good percentage of GNP to telecommunications investment. Latin American governments should subsidize the local telecommunications industry and consider giving tax breaks to promote this sector. This finding contradicts previous studies on least developed countries, in which the authors discourage government subsidies of locally owned telecommunications companies [Mbarika, 2000]. These researchers argue that such subsidies could result in lack of innovation and competitiveness since the government will step in whenever there is a problem. However, the comments below from Latin American stakeholders strengthen their reason for encouraging domestic-generated funding factor:

> *"…I think that it is necessary to allocate 5% of the GDP to investments in telecommunications, because they are very important for the future since they are growing rapidly."*

> *"Improve the economy by reducing the interest rates, encouraging the international investment and the local growth will produce technological development."*

GEOGRAPHICAL-ORIENTED STRATEGY

Latin American stakeholders ranked "wireless communication" factor highest:

By ranking the wireless communication factor highest the stakeholders believe that Latin American countries should install mobile satellite services and fixed cellular networks to overcome the geographical-oriented obstacles. Because of their ubiquitous coverage, satellites would provide wider connectivity in Latin American countries. Wireless communications in this context includes placing in communities without telecommunications semi-fixed analog mobile phone cells, cheap handsets, and a VSAT link to regional hubs.

Wireless telecommunications infrastructures are growing tremendously in many developing countries, fast surpassing land-line (wired) infrastructures. Wireless infrastructures offer lower line

cost, improved reliability, and greatly-enhanced flexibility. Developing countries in South East Asia, Eastern Europe, and Latin America are turning to cellular to provide basic telephone services. Predictions that basic telephony in developing countries will migrate to cellular and other advanced wireless technologies, leaving legacy wire line systems dedicated for data services,are now conventional wisdom (Mbarika, 2000; Mbarika, 2001).

A wire line system typically costs much more than a digital cellular systems. The cost difference is mainly due to the labor cost of installing copper cabling between the central office and customer premise.

In developing countries, cellular systems are more reliable than wire line systems whose cables are pilfered for the value of their copper and sold on the black market. Improved reliability and lower network maintenance costs are major reasons for the spread of wireless technologies in Latin America.

The stakeholders highly ranked growth of rural telecommunications infrastructures. With wireless infrastructures, penetrating rural areas is quite feasible. VSATs can easily be placed in rural areas that will provide such communities with telephone and even Internet access. Encouraging rural telecommunications access should be one of the paramount issues that developing countries must address, particularly Latin American countries, where 65 to70% of citizens live in rural areas and lack any form of telephone or Internet access [CIA, 2004]. Some stakeholders from Ecuador commented:

> *"Everything that refers to rural inversion is positive, because it involves the majority of the country."*

> *"The [rural] regions have to be attended urgently, so Ecuador could move ahead and have good telecommunication services in the country."*

IX. IMPLICATIONS AND FUTURE RESEARCH

Our results can set the stage for future research.

1. With the exception of the privatization strategy, governmental and non-governmental stakeholders agreed on all strategies. The perceptions of these stakeholders are important to teledensity growth in the region. Agreeing on most of the strategies implies that we can expect greater cooperation between the government and the private sector in promoting telecommunications. The results of this study demonstrate that Latin America's telecommunications stakeholders favor strategies that were implemented successfully in other countries to address their low teledensity problems.

2. No differences were found in the perceptions of strategies across our two samples: Colombia and Ecuador. Although Colombia's telecommunications form progressed further than Ecuador's, no significant difference was found in the perceptions of the stakeholders on the strategies across these two countries (See Table A12 in Appendix III). Perceptions are not related to stages of development.

Colombian and Ecuadorian stakeholders learned from other developing nations with similar socio-economic structures. They believe what worked for those developing nations will work for Colombia and Ecuador. In the case of privatization, however, stakeholders disagree. Many developing nations are becoming weary of privatization, which comes as a "mixed-blessing." On the one hand, most countries that privatized their telecommunications sector enjoyed some growth in such infrastructures. However, some stakeholders note that in most developing countries, when the government privatizes the telecommunications sector it is difficult to find local investors to buy the incumbent. Foreign investors (mostly from Europe and the US) take over the privatized entities, improve the state of the entities, but take the profits out of these developing nations.

Further research is needed in this area. Both more Latin American countries and greater focus in-depth on individual countries is needed. A longitudinal multi-method case study approach can be used to study these countries to yield deeper insights into country-specific strategies.

Research on the diffusion of wireless telecommunications infrastructure within the Latin American context is needed because of the difficulty and labor intensity of digging trenches for new physical telephone circuits. Even through wireless technologies is heralded as the "way to go," the question whether it will promote universal access still remain unanswered in the Latin American region.

X. CONCLUSION

This study examines a comprehensive set of teledensity-improving strategies found in the literature by investigating the perceptions of stakeholders currently working in two Latin American countries: Colombia and Ecuador. We attempt to provide a greater understanding of strategies to overcome the low teledensity problems in Latin America by concentrating on these two countries, and two groups of stakeholders, governmental and non-governmental. Many studies today examine strategies for growth of the Internet and electronic commerce in Latin America. They place the 'cart before the horse.' While Internet applications can be built simultaneously with the telecommunications infrastructure, we caution that large investments in applications without sound teledensity could lead to failure.

Considering the level of agreement among the governmental and non-governmental stakeholders, our study suggests the following prescriptive directions for Latin American countries:

- Develop strong alliances with more developed nations. Due to their proximity to the United States, Latin American countries have a major advantage over other developing nations in establishing such alliances;

- Encourage local investors to enter the telecommunications sector, ensuring that much of the profits are re-invested in the local economy;

- Develop local expertise to ensure continuity of telecommunications projects.

Further research will provide more prescriptive directions to Latin American policy makers and development agencies to improve the teledensity of countries within the region. Given the broad consensus we found among the Latin American stakeholders survey in this study, we believe that countries within the region are not far from developing their teledensity and wireless telecommunications infrastructures. This consensus will hopefully be a starting base upon which complex telecommunications-related applications can be built. Examples of such applications include the Internet and related technologies such as distance learning, telemedicine, and electronic commerce, all of which could promote sustainable socio-economic development within the Latin American region.

Editor's Note: This article was received on January 20, 2004 and was published on July 10, 2005.The article was with the author for 11 months for 3 revisions.

REFERENCES

EDITOR'S NOTE: The following reference list contains the address of World Wide Web pages. Readers who have the ability to access the Web directly from their computer or are reading the paper on the Web, can gain direct access to these references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.

2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.

3. the authors of the Web pages, not CAIS, are responsible for the accuracy of their content.

4. the author of this article, not CAIS, is responsible for the accuracy of the URL and version information.

Bernt, P. and Weiss, M. (1993). *International Telecommunications.* Carmel, Indiana: Sams.

Bruce, R. (1989). *Restructuring the Telecommunications Sector in Developing Countries: New Options for Policymakers* IEEE Technology and Society, Vol. 8, No. 4, pp. 16-20.

CIA (2004). CIA World Factbook 2004. http://cia.gov/cia/publications/ factbook/index.html, Current as of September 2004.

Forman-Peck, J. & Muller, J. (1988). *European Telecommunications Organizations.* Baden_Beden: Nomos Verlagsgesellschaft.

Gille, L. (1986). *Growth and Telecommunications.* In *Information, Telecommunications and Development,* pp. 25-61. Geneva: ITU.

Hunt, D. (1997). The Potential of Telecommunications: Income Distribution in Mercosur. *Vital Speeches of the Day*; New York;.City Publishing Company, Inc., Vol. 64, No. 3, p. 85-89.

Hyden, G. & Bratton, M. (1992). *Governance and Politics in Africa.* London: Lynne Rienner Publishers.

Ikenberry. J. G. (1990). *The International Spread of Privatization Policies: Inducements, Learning, and "Policy Bandwagoning."* In E. N. Suleiman & J. Waterbury (Eds.), *The Political Economy of Public Sector Reform and Privatization*,. Boulder, CO: Westview Press. pp. 88-110

Independent Commission for World Wide Telecommunications Development (The Maitland Commission). (1984). *The Missing Link.* Geneva: ITU.

International Development Research Centre (IDRC). (1990). *National Information and Informatics Policies in Africa. Proceedings of the IDRC Regional Seminar held in Addis Ababa, Ethiopia,* November 1988.

International Telecommunications *Satellite Organization (INTELSAT) Annual Report 1989-1990.* INTELSAT: Washington. D.C.

International Telecommunications Union. (1981) *Appropriate Modern Telecommunications Technology for Integrated Rural Development in Africa.* ITU: Geneva, Switzerland.

International Telecommunications Union. (1983,1986,1987). *Pan-African Telecommunications Network.* Geneva: ITU.

International Telecommunications Union (1984). *The Missing Link: Report of the Independent Commission for Worldwide Telecommunications Development.* Geneva: ITU.

International Telecommunications Union (ITU). (1994). *World Telecommunications Development Report.* Geneva: ITU.

International Telecommunications Union (ITU). (1995). *World Telecommunications Development Report*: Geneva: ITU.

International Telecommunications Union (ITU). (1998). *World Telecommunications Development Report*: Geneva: ITU.

International Telecommunications Union (ITU). (1999). *Telecommunications Indicators Handbook.* Geneva: ITU.

Jamison, N. L. (1991). *Communication and the New Paradigm for Development*. In F. L. Casmir (Ed.), *Communication in Development*, pp. 27-50. Norwood, NJ: Albex.

1995). *Telematics for development in Africa: a Global Context. Proceedings of the Regional Symposium on Telematics for Development in Africa.* United Nations Economic Commission for Africa, Addis Ababa, April 1995

Jussawalla, M. (1988). *Information Economies and the Development of Pacific Countries*. In M. Jussawalla, D. M. Lamberton, & N. D. Karunaratne (Eds.). *The Cost of Thinking: Information Economies of Ten Pacific Countries*, pp. 15-43. Norwood, NJ: Ablex.

Kantor, J. (1991). *Effects of Computer Administration and Identification on the Job Descriptive Index (JDI).* Journal of Business and Psychology. (5), pp. 309-323.

Kerlinger, Fred. N. (1986). *Foundations of Behavioral Research (3rd ed.).* Fort Worth: Harcourt Brace Jovanovich College Publishers.

Kueng, P. and Wettstein, T. (1999). Measuring Customer Satisfaction Using IT: A Case Study. *Proceedings of the Sixth European Conference on Information Technology Evaluation:* Uxbridge (UK).

Littlechild, S. (1978). *Organization and Performance: An International Comparison of Telecommunications Systems.* In P. Polishuk and M. O'Bryant (Eds.) *Telecommunications and Economic Development*. Boston MA: Horizon House International.

Matz, M. (1999). *Administration of Web versus Paper Surveys: Mode Effects and Response Rates.* 86p. Paper # 2555: UNC: Chapel Hill, North Carolina.

Mbarika, V. 2000. Telecommunications Stakeholders' Perceptions of Strategies to Overcome Teledensity Growth Obstacles of Africa's Least Developed Countries. *Proceedings of the International Conference on Information Systems (ICIS 2000).*Brisbane, Australia: Association for Information Systems

Mbarika, V. 2001. Africa's Least Developed Countries' Teledensity Problems and Strategies. Yaoundé, Cameroon: ME & AGWECAMS Publishers,

Mbarika, V., Jensen, M., Meso, P. 2002. Cyberspace Across Sub-Saharan Africa: From Technological Desert Towards Emergent Sustainable Growth? *Communications of the ACM,* 45 (12), pp. 17-21.

McCoy, S. and Marks, P. (2001), "Using Electronic Surveys to Collect Data: Experiences from the Field," *Proceedings of the 2001 Americas Conference on Information Systems*, Boston, MA: Association for Information Systems.

Pegasus Research International (2003). Latin American Web Users. *http://www.pegasusresearch.net/metrics/growthla.htm*. Current as of January 2003.

Rosenfeld, P., Doherty, L., Kantor, J. and Greaves, J. (1989). *Attitude Assessment in Organizations: Testing Three Microcomputer-Based Survey Systems.* J*ournal of General Psychology*. (116), 145-154.

Saunders, R. J. (1982*). Telecommunications in Developing Countries: Constraints on Development*. In M. Jussawall & D.M. Lamberton (Eds.), *Communication Economics and Development.* pp. 190-210. Honolulu: The East-West Center.

Saunders, R. J., Warfbrd, J. I., & Welienius, B. (1994). *Telecommunications and Economic Development (2nd ed.).* Baltimore, MD: John Hopkins University Press.

Wellenius, B. (1984). Telecommunications in Developing Countries. *Finance and Development*, Vol. 21, September, pp 33-46.

Wygant, S. and Lindorf, R. (2000). Surveying Collegiate Surfers - Web Methodology or Mythology?*.* Survey Network. http://www.surveynetwork. com/surveys.asp

Appendix I. Telecommunications Indicators for Latin America and the Caribbean

Country	Population	Main telephone lines		Mobile subscribers		Total density	Cost of cellular services (US$)		
		Total	per 100 inhabitants	Total	per 100 inhabitants	per 100 inhabitants	3 minute call	Monthly subscription	Connection charge
Antigua and Barbuda	76,684	38,300	49.95	22,000	28.69	78.63	N/A	N/A	N/A
Aruba	102,537	38,100	37.16	15,000	14.63	51.79	N/A	N/A	N/A
Bahamas	304,913	114,347	37.50	31,524	10.34	47.84	N/A	N/A	N/A
Barbados	267,498	123,832	46.29	28,467	10.64	56.93	1.25	16.25	N/A
Cayman Islands	42,620	35,000	82.12	10,700	25.11	107.23	N/A	N/A	N/A
Cuba	11,199,176	488,606	4.36	6,536	0.06	4.42	1.20	40.00	120.00
Dominica	77,144	22,700	29.43	1,200	1.56	30.98	N/A	N/A	N/A
Dominican Rep.	8,553,744	894,164	10.45	705,431	8.25	18.70	N/A	N/A	N/A
Grenada	94,430	31,355	33.20	4,300	4.55	37.76	0.56	18.52	55.19
Guadeloupe	456,000	204,900	44.93	169,840	37.25	82.18	N/A	N/A	N/A
Haiti	8,142,471	72,500	0.89	55,000	0.68	1.57	N/A	N/A	N/A
Jamaica	2,576,085	511,661	19.86	366,952	14.24	34.11	0.25	18.27	17.33
Martinique	395,000	171,600	43.44	162,080	41.03	84.48	N/A	N/A	N/A
Netherlands Antilles	215,277	80,000	37.16	N/A	N/A	N/A	N/A	N/A	N/A
Puerto Rico	3,914,717	1,331,851	34.02	926,448	23.67	57.69	N/A	N/A	N/A
Saint Kitts and Nevis	38,522	21,910	56.88	1,200	3.12	59.99	N/A	N/A	N/A
Saint Lucia	155,991	48,900	31.35	2,500	1.60	32.95	N/A	N/A	N/A
St. Vincent & Grenadines	113,428	24,906	21.96	2,361	2.08	24.04	0.99	22.22	50.00
Trinidad and Tobago	1,294,368	299,070	23.11	133,198	10.29	33.40	0.67	23.02	15.87
Virgin Islands	121,124	68,283	56.37	35,000	28.90	85.27	N/A	N/A	N/A
Caribbean	**38,141,729**	**4,621,985**	**12.12**	**2,679,737**	**7.07**	**19.18**	**0.82**	**23.05**	**51.68**

Argentina	35,850,000	7,894,205	22.02	6,049,963	16.88	38.90	N/A	N/A	N/A
Belize	240,204	35,754	14.88	16,812	7.00	21.88	1.27	17.50	24.50
Bolivia	8,208,251	504,196	6.14	606,693	7.39	13.53	1.14	1.62	0.00
Brazil	169,799,168	30,926,272	18.21	23,188,172	13.66	31.87	0.25	10.93	16.39
Chile	15,211,000	3,386,999	22.27	3,401,525	22.36	44.63	N/A	N/A	N/A
Colombia	42,321,000	7,192,778	17.00	2,256,801	5.33	22.33	N/A	N/A	N/A
Costa Rica	4,023,000	898,734	22.34	205,275	5.10	27.44	0.34	12.82	81.12
Ecuador	12,646,000	1,265,191	10.00	482,213	3.81	13.82	1.50	42.00	250.00
El Salvador	6,276,000	570,000	9.08	707,468	11.27	20.35	N/A	N/A	N/A
French Guiana	181,000	50,000	27.62	39,830	22.01	49.63	N/A	N/A	N/A
Guatemala	11,385,000	678,358	5.96	843,091	7.41	13.36	N/A	N/A	N/A
Guyana	861,000	68,400	7.94	39,830	4.63	12.57	1.25	16.69	58.42
Honduras	6,485,000	298,713	4.61	155,271	2.39	7.00	N/A	N/A	N/A
Mexico	98,881,000	12,331,676	12.47	14,077,880	14.24	26.71	0.82	25.37	0.00
Nicaragua	5,074,000	158,555	3.12	90,294	1.78	4.90	N/A	N/A	N/A
Panama	2,839,177	429,135	15.11	410,401	14.45	29.57	N/A	N/A	N/A
Paraguay	5,496,000	299,633	5.45	820,810	14.93	20.39	0.77	34.42	0.00
Peru	25,662,000	1,717,117	6.69	1,273,857	4.96	11.66	N/A	N/A	N/A
Suriname	434,000	75,308	17.35	41,048	9.46	26.81	0.61	12.48	0.00
Uruguay	3,337,000	929,141	27.84	440,196	13.19	41.03	0.37	24.21	0.00
Venezuela	24,170,000	2,535,966	10.49	5,447,172	22.54	33.03	0.79	17.16	9.86

All values for Year 2001; Source: ITU 2002

APPENDIX II. QUESTIONNAIRE

<u>Latin American Telecommunications Stakeholders' Perceptions of Strategies
to Overcome Obstacles to Growth of Teledensity in Latin American Countries</u>

There are three sections of this questionnaire. We will appreciate if you would complete all three sections. If you choose to, we will be glad to provide you with a summary of the findings from this research. This may help your organization as you work on strategies to improve the teledensity of the Latin American countries you are involved with. If you wish to obtain a summary of the findings from this research, please remember to complete the information section and check the appropriate boxes at the end of this questionnaire.

Section 1

Which of the following most closely represents your organizational affiliation?[**]

1.   ( ) Government and Parastatal[2] (PTT)

2.   ( ) Telecommunications Regulator (as part of a Latin American government)

3.   ( ) Telecommunications Regulator (not part of a Latin American government)

4.   ( ) Telecommunications Operator (as part of a Latin American government)

5.   ( ) Telecommunications Operator (not part of a Latin American government)

6.   (   ) Academia, Research Center, or IT expert (as part of a Latin American government)

7.   (   ) Academia, Research Center, or IT expert (not part of a Latin American government)

8.   ( ) International/Regional organization (Funding, Aid)

9.   ( ) Equipment Manufacturer (as part of a Latin American government)

10. ( ) Equipment Manufacturer (not part of a Latin American government)

11. ( ) Other (please specify):_____

<u>Section 2</u>

12. Using the scale below, please indicate whether you think a particular obstacle is a major obstacle to the growth of teledensity in Latin America. The scale goes from **1 (not an obstacle)** to **7 (major obstacle)**.

[**] Very important information needed for this project.
[2] Parastatal: A mixture of both government and private ownership.

Obstacle
Organizational / Policy-oriented obstacle 1. There seems to be insufficient management autonomy of the telecommunications operators in Latin American Countries. 2. Telephone services are still provided by certain government monopoly-run organizations. 3. Government monopoly-run telecommunications organizations may be bureaucratic and counter productive. **Technology-oriented obstacle** 1. Many Latin American countries operate outdated equipment and tend to have inadequate maintenance for their equipment. 2. Latin American Countries typically have difficulties finding and keeping technically qualified maintenance personnel. 3. Lack of sufficient technical staff may result in poor quality of service and loss of revenues. **Finance-oriented obstacle** 1. Latin American Countries seem to have low levels of internal and external investments in telecommunications. 2. In terms of external investments, the devaluation of some Latin American Countries currencies seems to limit the availability of foreign exchange. 3. Currency devaluation accounts for high exchange rates with major currencies that may be needed to purchase telecommunications equipment and other telecommunications services from abroad. **Geographic-oriented obstacle** 1. Certain policy makers in Latin American Countries seem to regard telecommunications as an urban luxury, which may therefore limit telephone services to mostly cities and urban areas. 2. In many Latin American Countries, the rural life styles of people scattered throughout a wide geographical area result in the requirements for very heavy investment to give service to very small numbers of people. 3. Telecommunications investments in rural areas may not be commercially justifiable and may present a huge burden for the telecommunications operator.

Section 3

Now we would like to ask you about possible strategies to overcome each obstacle. Please indicate the extent of your agreement or disagreement with the suggested strategies to promote growth of teledensity in Latin American Countries by choosing from strongly disagree (1) to strongly agree (7).

Organizational / Policy-Oriented Obstacle and Suggested Strategies

OBSTACLE
There seems to be insufficient management autonomy of the telecommunications operators in Latin American Countries. This is because telephone services are still provided by certain government monopoly-run organizations, which may be bureaucratic and often counter productive. The scale is from strongly disagree (1) to strongly agree (7).

SUGGESTED STRATEGIES

Factor 1: Privatization / Free Enterprise

1. Turn the telecommunications operator into an independent company with complete autonomy.

2. Sell shares of the telecommunications operator to the public.

3. Encourage competition among the telecommunications operators.

Factor 2: Regulation—Non-Governmental

4. Establish an impartial, *non-governmental* regulatory body to control the telecommunications industry.

5. Establish an impartial, *non-governmental* regulatory body to set and uphold standards within the telecommunications industry.

Factor 3: Regulation— Governmental

6. Establish an impartial, *governmental* regulatory body to control the telecommunications industry.

7. Establish an impartial, *governmental* regulatory body to set and uphold standards within the telecommunications industry.

Additional Comments: Using the space below, please share your expertise and knowledge on the above-suggested strategies for Organizational / Policy-Oriented obstacles.

Technology-Oriented Obstacle and Suggested Strategies

<u>**OBSTACLE**</u>
Many Latin American Countries operate outdated equipment and tend to have inadequate maintenance for their equipment. These countries typically have difficulties finding and keeping technically qualified maintenance personnel, which may result in poor quality of service and loss of revenues. The scale is from strongly disagree (1) to strongly agree (7).

Factor 1: Self-sufficiency (Self-sustenance)

8. Latin American Countries should review the possibilities for local or regional manufacture of telecommunications equipment.

9. Operators and manufacturers should enhance the training opportunities they offer to telecommunications staff of Latin American Countries.

10. Latin American Countries should be trained to carry out monthly routine maintenance of already existing equipment.

Factor 2: Latin American Foreign Alliance / Joint Ventures

11. Latin American Countries, with assistance of funding organizations, should set up long-term contracts to buy new knowledge from developed countries (i.e. advocate for joint ventures).

12. Development organizations should conduct seminars to improve the qualifications of experts of Latin American Countries.

Factor 3: Total Foreign Dependency

13. Latin American Countries should solicit help from developed countries to build and install their telecommunications equipment.

14. When purchasing equipment from foreign countries, Latin American Countries should ensure that the contract includes commitments on the supply of spare parts and post-installation review.

15. Latin American Countries should hire foreign experts to perform thorough routine maintenance of already existing equipment.

Additional Comments: Using the space below, please share your expertise and knowledge on the above-suggested strategies for Technology-Oriented obstacles.

Finance-Oriented Obstacle and Suggested Strategies

<u>**OBSTACLE**</u>
Latin American Countries seem to have low levels of internal and external investments in telecommunications. In terms of external investments, the devaluation of some Latin American Countries currencies seems to limit the availability of foreign exchange. This, therefore, leads to very high exchange rates with major currencies that may be needed to purchase telecommunications equipment and other telecommunications services from abroad. The scale is from strongly disagree (1) to strongly agree (7).

<u>**SUGGESTED STRATEGIES**</u>

Factor 1: Local / Domestic / Internal-Generated Funding

16. Devote 1 to 2 percent of GNP to telecommunications investment.

17. Governments of Latin American Countries should subsidize the local telecommunications industry in order to expand their turnover and employment.

18. To save cost of equipment purchase, Latin American Countries should consider pooling their purchases of commonly used equipment including terminals and components.

19. Encourage growth in the service sector (tourism, transportation, etc), which will be a major source of income that can in turn increase the provision for more phones.

Factor 2: External / Foreign-Generated Funding

20. Countries and international agencies with development assistance programs should give higher priority to growth of teledensity in Latin American Countries.

21. Funding institutions must ease conditions to grant loans for the purpose of establishing basic telecommunications infrastructure in Latin American Countries.

Factor 3: Private sector investment

22. Encourage private investments through the reorganization of the sector and by using policy to direct investment into the sector.

23. Encourage the participation of foreign private investors in funding directed towards growth of teledensity.

Additional Comments: Using the space below, please share your expertise and knowledge on the above-suggested strategies for Finance-Oriented obstacles.

Geographic-Oriented Obstacle and Suggested Strategies

Geographic-Oriented Obstacle and Suggested Strategies
OBSTACLE Certain policy makers in Latin American Countries seem to regard telecommunications as an urban luxury, which may therefore limit telephone services to mostly cities and urban areas. Also, in many Latin American Countries, the rural life styles of people scattered throughout a wide geographical area result in the requirements for very heavy investment to give service to very small numbers of people. This may not be commercially justifiable and may present a huge burden for the telecommunications operator. The scale is from strongly disagree (1) to strongly agree (7).
SUGGESTED STRATEGIES ***Factor 1: Wireless Communication*** 24. Mobile satellite services and fixed cellular networks should be installed. 25. Use satellites to provide telecommunications in Latin American Countries due to the ubiquitous coverage offered by satellite technology. 26. Use semi-fixed analog mobile phone cells placed in communities without telecommunications along with cheap handsets and a VSAT link to regional hubs. ***Factor 2: Rural Development*** 27. Telecommunications service carriers in rural areas should be provided easy loan requirements, lower taxes, and ease to register such businesses. 28. Mandate that new service providers serve both urban and rural areas, using resources of urban areas to subsidize rural areas. ***Factor 3: Public Telecommunications Access*** 29. Encourage private investors to establish pay phone services such as public telephone booths. 30. Encourage private investors to establish telecentres or shared community access in order to promote use of telephone services and other forms of shared access, which could in turn promote use of advanced services such as the Internet.

Additional Comments: Using the space below, please share your expertise and knowledge on the above-suggested strategies for Geographic-Oriented obstacles.

Please Circle:

31. Latin American Countries should impose what maximum percentage of foreign ownership of their telecommunications operators.

a) Less than 40 %

b) Between 40 - 60%

c) More than 60 %

32. Telecommunications operators should be under (check one):
   a) Government ownership—state owned

   b) Private ownership---owned by a private entity or multiple stockholders

   c) Mixed ownership—shares owned by both government and private entities

Please answer the following questions about yourself.

We promise your name will never be associated with any of your opinions, but will be used ONLY to provide feedback to you.

( ) Mr.   ( ) Mrs.   ( ) Ms.   ( )Dr.   ( ) Other (   )

Name (Print):First_____Last_____

Title:_____

Organization:_____

Address:_____

Country:_____

Telephone: Country/City Code_____ Number_____

Facsimile: Country/City Code _____Number_____

Email address (if any): _____

Web Page (if any): _____

☐ *Please indicate (by checking the box) if you are willing to be contacted for a phone interview to further discuss the above strategies.*

☐ *Please indicate (by checking the box) if you are would like to obtain a summary of the findings from this research*

Thank you very much for your cooperation

Appendix III. ANOVA Results Showing Non-Significant Differences Between Government and Non-Government Stakeholders' Perceptions of Strategies

Table A1. ANOVA results for Organizational/Policy-Oriented Strategy: Dependent Variable is Regulation—Non-Governmental)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.644	1	.644	.263	.609
Intercept	2068.258	1	2068.258	845.458	.000
Governmental / Non-Governmental Stakeholder	.644	1	.644	.263	.609
Error	198.152	81	2.446		
Total	2820.750	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A2. ANOVA Results for Organizational/Policy-Oriented Strategy: Dependent Variable is Regulation—Governmental

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6.334	1	6.334	1.286	.260
Intercept	1215.074	1	1215.074	246.630	.000
Governmental / Non-Governmental Stakeholder	6.334	1	6.334	1.286	.260
Error	389.210	79	4.927		
Total	1869.250	81			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A3. ANOVA results for Technological-Oriented Strategy (Dependent Variable is Self-Sufficiency

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2.612	1	2.612	2.988	.088
Intercept	2355.913	1	2355.913	2694.966	.000
Governmental / Non-Governmental Stakeholder	2.612	1	2.612	2.988	.088
Error	70.809	81	.874		
Total	3101.556	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A4. ANOVA results for Technological-Oriented Strategy: Dependent Variable is Latin American Foreign Alliance

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.003	1	.003	.004	.947
Intercept	2704.075	1	2704.075	3823.047	.000
Governmental / Non-Governmental Stakeholder	.003	1	.003	.004	.947
Error	57.292	81	.707		
Total	3435.250	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A5. ANOVA results for Technological-Oriented Strategy: Dependent Variable: Total Foreign Dependency

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.857	1	.857	.599	.441
Intercept	1777.002	1	1777.002	1241.967	.000
Governmental / Non-Governmental Stakeholder	.857	1	.857	.599	.441
Error	115.895	81	1.431		
Total	2291.250	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A6. ANOVA results for Financial-Oriented Strategy: Dependent Variable is Domestic-Generated Funding

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.481	1	.481	.370	.545
Intercept	1986.749	1	1986.749	1525.149	.000
Governmental / Non-Governmental Stakeholder	.481	1	.481	.370	.545
Error	105.515	81	1.303		
Total	2551.181	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A7. ANOVA results for Financial-Oriented Strategy: Dependent Variable is Foreign-Generated Funding

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.032	1	.032	.032	.859
Intercept	2291.393	1	2291.393	2270.004	.000
Governmental / Non-Governmental Stakeholder	.032	1	.032	.032	.859
Error	81.763	81	1.009		
Total	2951.000	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A8. ANOVA results for Financial-Oriented Strategy: Dependent Variable is Private Sector Investment

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.497	1	.497	.698	.406
Intercept	2588.412	1	2588.412	3638.067	.000
Governmental / Non-Governmental Stakeholder	.497	1	.497	.698	.406
Error	57.630	81	.711		
Total	3328.500	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A9. ANOVA results for Geographical -Oriented Strategy: Dependent Variable is Wireless Communication

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.366	1	.366	.551	.460
Intercept	2629.665	1	2629.665	3957.756	.000
Governmental / Non-Governmental Stakeholder	.366	1	.366	.551	.460
Error	53.819	81	.664		
Total	3301.583	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A10. ANOVA results for Geographical -Oriented Strategy: Dependent Variable is Rural Development)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.003	1	1.003	.943	.335
Intercept	2452.690	1	2452.690	2304.209	.000
Governmental / Non-Governmental Stakeholder	1.003	1	1.003	.943	.335
Error	86.220	81	1.064		
Total	3093.250	83			

*P < 0.05; **p < 0.01; ***p < 0.001

Table A11. ANOVA results for Geographical -Oriented Strategy (Dependent Variable: Public Telecommunications Access)

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.129	1	.129	.200	.656
Intercept	2697.779	1	2697.779	4183.117	.000
Governmental / Non-Governmental Stakeholder	.129	1	.129	.200	.656
Error	52.239	81	.645		
Total	3398.500	83			

*P < 0.05; **p < 0.01; ***p < 0.00

Table A12. ANOVA Results for All Strategies across Countries
(Colombia and Ecuador)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
PRIVFREE	Between Groups	.050	1	.050	.041	.840
	Within Groups	99.013	81	1.222		
	Total	99.063	82			
REGNONG	Between Groups	.232	1	.232	.095	.759
	Within Groups	198.563	81	2.451		
	Total	198.795	82			
REGGOV	Between Groups	7.472	1	7.472	1.521	.221
	Within Groups	388.071	79	4.912		
	Total	395.543	80			
SELFSUF	Between Groups	.101	1	.101	.112	.739
	Within Groups	73.321	81	.905		
	Total	73.422	82			
AFRFORAL	Between Groups	.511	1	.511	.729	.396
	Within Groups	56.784	81	.701		
	Total	57.295	82			
TOTFODEP	Between Groups	2.035	1	2.035	1.437	.234
	Within Groups	114.717	81	1.416		
	Total	116.752	82			
LOCFUND	Between Groups	.027	1	.027	.021	.885
	Within Groups	105.969	81	1.308		
	Total	105.997	82			
FORFUND	Between Groups	1.165	1	1.165	1.171	.282
	Within Groups	80.630	81	.995		
	Total	81.795	82			
PRIV_INV	Between Groups	.379	1	.379	.531	.468
	Within Groups	57.748	81	.713		
	Total	58.127	82			
WIRELESS	Between Groups	1.654	1	1.654	2.550	.114
	Within Groups	52.531	81	.649		
	Total	54.185	82			
PUBLIC	Between Groups	.610	1	.610	.955	.331
	Within Groups	51.757	81	.639		
	Total	52.367	82			
RURAL	Between Groups	2.454	1	2.454	2.345	.130
	Within Groups	84.768	81	1.047		
	Total	87.223	82			

ABOUT THE AUTHORS

Scott McCoy is Assistant Professor of MIS in the School of Business at the College of William and Mary. He earned his PhD in Information Systems from the University of Pittsburgh. His research in cross cultural issues in IS, human-computer interaction, IT accessibility, and telecommunications policy were presented in several national and international conferences. Journals in which his work appears include *International Journal of Cross Cultural Management*, *Communications of the ACM*, *Communication of the AIS*, *Information Technology and People*, and the *Journal of the Association for Information Systems*.

Victor W. Mbarika is on faculty in the College of Business at Southern University and A&M College. He holds a B.S. in Management Information Systems from the U.S. International University Nairobi/San Diego, CA, a M.S. in MIS from the University of Illinois at Chicago, and a Ph.D. in MIS from Auburn University. His research in Multimedia Learning and Telecommunications Diffusion in Developing Countries is published (or is forthcoming) in 22 academic journals and three book chapters. He also has over 45 conference publications.