

# Telecommunications Stakeholder Perceptions of Teledensity: A Comparison of Stakeholders in the Latin American Region to those in Sub-Saharan Africa

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## ABSTRACT

*Prior research has identified specific factors that hinder growth of teledensity in developing countries and specific strategies used to overcome such limitations both in Latin America and in Sub-Saharan Africa. Prior research has also reported on the perceptions that telecommunications stakeholders have on how various strategies can inform and assist in the enhancement of teledensity in each of the two continental regions. This study investigates similarities and differences in the telecommunication stakeholders' perspectives of specific strategies used to address teledensity limitations in Latin America as well as in Sub-Saharan Africa. Independent samples of survey participants (Latin America's and Sub-Saharan Africa's telecommunications stakeholders) analyzed the strategies. Using appropriate statistical procedures we examined these stakeholders' perceptions to find areas of commonality and difference in how their perspectives of select strategies. Qualitative comments to support the stakeholders' responses are reported, together with future research implications.*

## I. INTRODUCTION

Teledensity is defined as number of main telephone lines for every one hundred inhabitants, and is a leading measure of the telecommunications infrastructures within a country (McCoy and Mbarika, 2005). Telecommunications infrastructures provide the base for important applications on the Internet, such as online education, and e-commerce while promoting resource mobilization through increased participation of the labor-force in a county's economic activities.

Although information and communication technologies (ICT) are fundamental to their socioeconomic development, developing countries were never in the position to exploit the full potentials of such technologies [Mbarika et al., 2002]. Several researchers have argued that low teledensity is a key reason for limited and or slow ICT growth in developing countries [Wellenius, 1984; Hunt, 1997; Odedra, 1993]. Prior research to our study has identified specific factors that hinder growth of teledensity and adoption of technologies in

developing countries and strategies to address such factors [Mbarika, 2000, 2001; Musa, 2006]. In this study, we compare and contrast the perspectives of Latin American stakeholders and Sub-Saharan Africa Stakeholders about the strategies to address the obstacles to teledensity growth in each of these two continental regions.

## II. OBSTACLES TO GROWTH OF TELEDENSITY

Bernt and Weiss [1993] proposed a framework that groups international telecommunications issues into four categories or issues: organizational, technological, financial, and geographical.

- Organizational issues deal with the strategic structuring of telecommunications entities and the industry as a whole. This includes governmental monopoly versus competition, deregulation, and privatization.
- Technological issues refer to the stock of telecommunications technologies that an organization or nation state selects to acquire and the maintenance of these pieces of equipment.
- Financial issues concern the funding of the development and operations of a country's telecommunications infrastructure.
- Geographical issues deal with the universality of access to telecommunications infrastructure by the residents of a nation. Thus they relate to the provision of telecommunications infrastructure to urban and rural areas within a country.

McCoy and Mbarika [2005] and Mbarika [2001], modified Bernt and Weiss' framework by placing teledensity diffusion at the core and then employed the modified framework to evaluate the perspectives of stakeholders on the strategies for overcoming obstacles to teledensity. Their studies focused on Latin America [McCoy, 2005] and Sub-Saharan Africa [Mbarika, 2001] respectively. They justified their modification on the premise that teledensity is a measure of telecommunications infrastructure.

## III. STRATEGIES TO OVERCOME TELEDENISTY PROBLEMS

Amidst these shortcomings, telecommunications stakeholders in Latin America as well as those in Africa engaged in the task of developing strategies that would ensure that the telecommunications industry play 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. The strategies under debate were largely derived from prior research on telecommunications enhancement strategies as synthesized in Mbarika [2000, 2001]. These strategies are as summarized below:

**Organizational/Policy-Oriented Strategies:** These strategies identify the best approach to the 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.

**Technological-Oriented Strategies:** Concerned with identifying the most effective approach to attaining an optimal level of domestically developed telecommunications infrastructure, technology and trained personnel. One option is for the telecommunication industry to be self sufficient. A second option is for the telecommunications industry to rely on a foreign alliance. In this option, developing 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.

**Finance-oriented Strategies:** These strategies deal with the funding options for the telecommunications industry in a developing country. One option is to generate funding domestically. Possibilities under this option include devoting a percentage of GNP to telecommunications investment and providing government subsidies to the local telecommunications industry. A third option is to look toward foreign-generated funding by obtaining development assistance from other countries and international agencies.

**Geographical-oriented strategies:** Are concerned with options for improving the geographic coverage and reach of telecommunications infrastructure. 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.

**IV. RESEARCH OBJECTIVES**

The telecommunications stakeholders can be divided into two groups: government stakeholders (GSH) and non-government stakeholders (NGSH) [McCoy, 2005, Mbarika, 2001]. 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 when contrasted across the two continental regions, and what these differences, if any, are.

Table 1: Stakeholder Classifications

<b>Governmental Stakeholders (GSH)</b>	<b>Non-Governmental Stakeholders (NGSH)</b>
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 McCoy and Mbarika, 2005]

While McCoy and Mbarika [2005] and Mbarika [2001] compare the stakeholders groups, we contrast these groups of stakeholders across the two continental regions in which they have a vested interest – Latin America and Sub-Saharan Africa. Therefore, the differences and/or similarities in stakeholders' perspectives are fundamental to the scope to our study. We seek to explain some of the 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 that can be applicable across a broad range of developing countries, regardless of the continent to which they belong. As recognized in IS research implications for local and global context considerations, we are also interested in hashing out strategies that may be localized in scope to the two specific continental regions (Musa, 2006).

**V. RESEARCH QUESTION**

To investigate the similarities and differences in the perspectives held by stakeholders

for Latin America and those for Sub Saharan Africa on the strategies that could be used to address the obstacles to teledensity growth, we ask the question:

*Do telecommunications stakeholders for Latin America differ with those for Sub-Saharan Africa concerning their perspective of strategies for overcoming barriers to teledensity growth?* If we find a significant difference we aim to proceed further and address the questions:

a. What are the similarities across the two continental regions in their telecommunications stakeholders' perspectives of the strategy combinations best suited for overcoming obstacles to teledensity growth?

b. What are the differences across the two continental regions in their telecommunications stakeholders' perspectives of the strategy combinations best suited for overcoming obstacles to teledensity growth?

## VI. METHODOLOGY AND HYPOTHESES

We used data collected from two previous studies, one on Latin America [McCoy & Mbarika, 2005] and the other on Sub-Saharan Africa [Mbarika et al., 2004]. These data sets constituted of a total of 198 usable data points, with 92 stakeholders for Latin America and 106 stakeholders for Sub-Saharan Africa. The data in these data sets was combined to form the data for this study. McCoy [2005] and Mbarika [2001] had used both paper-based and web-based avenues in administering the survey instrument. In their published work, they validated the research instrument and the key constructs of the study's research model. Therefore we do not repeat the validation in this paper.

To address these research questions, we run two sets of regression analyses for each group of strategies. The regressions are run in SPSS version 10, on personal computer environment:

### *Influences of Stakeholder-Classification and Continent-of-Vested-Interest:*

The first set of regressions is to examine if the stakeholder grouping or the continent that a stakeholder had a vested interest in (hereafter referred to as continent-of-vested-interest) influences the stakeholder's ranking of the efficacy of representative teledensity growth strategies in addressing a given teledensity growth obstacle. Each of the four obstacles to teledensity growth namely, organizational, technological, financial and geographical obstacles are held as dependent variables in four respective regression equations. The independent variables in these regression models are defined by a) the stakeholder group to which a

particular stakeholder belongs; and b) the continental region that the stakeholder has a vested interest in; c) each strategy for overcoming a specific obstacle to teledensity growth, and d) the interaction effects of the various strategies on overcoming a specific obstacle to teledensity growth.

This study examines the perceived efficacy of several strategies in overcoming four obstacles to teledensity growth. For each obstacle, three strategies are examined. Therefore, for each of the four obstacles of teledensity growth examined in this study, the full regression model is given by:

$$Y = \beta_0x_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_1x_2 + \beta_5x_1x_3 + \beta_6x_2x_3 + \beta_7x_1x_2x_3 + \beta_8x_4 + \beta_9x_5 + x_e \dots \dots (1)$$

Where:

Y is the dependent variable. Each of the four obstacles to teledensity growth is a dependent variable. Therefore we run four regression equations.

$x_1$  is a the constant term in the regression equation

$x_1$  is the stakeholders' ranking of the first strategy for that obstacle,

$x_2$  is the stakeholders' ranking of the second strategy for that obstacle ,

$x_3$  is the stakeholders' ranking of the third strategy for that obstacle ,

$x_4$  is a variable used to code the stakeholder group (government or non-government) that a stakeholder belongs to

$x_5$  is a variable used to code the continent in which a stakeholder has a vested interest (Latin America or Sub Saharan Africa, and

$x_e$  is the error term

Given the above coding scheme, the effect of the continent-of-vested-interest on a stakeholder's perspective of the effects of representative strategies on a given obstacle to teledensity growth is given by the value of  $\beta_9$ . The influence of his/her stakeholder-group on his/her evaluation of the efficacy of respective strategies on each obstacle to teledensity growth is provided by  $\beta_8$ . A two-tail t test is used to investigate the hypothesis that continent-of-vested-interest has an influence on how stakeholders rank the efficacy of respective teledensity growth strategies. That is:

- H1: A stakeholder's continent-of-vested-interest (Latin America v/s Sub-Saharan Africa) influences a stakeholder's perspective of teledensity growth strategy impacts on teledensity growth obstacles. In other words:  $\beta_9 \neq 0$  ( $\beta_9$  is not equal to zero).

We then examine if stakeholder grouping had an influence on how stakeholders ranked the efficacy of respective teledensity growth strategies. The null hypothesis in this case is:

- H2: the stakeholder group that a stakeholder belongs to (government v/s non-government) influences the stakeholder's perspective of teledensity growth strategy impacts on teledensity growth obstacles. In other words:  $\beta_8 \neq 0$

***Comparison of Latin America's and Sub-Saharan Africa's Best Strategy-Combinations:***

Our second objective was to identify the specific ways in which Latin American and Sub-Saharan Africa telecommunications Stakeholders differed (or held similar positions) with respect to their perspectives on which strategy combinations best address each of the four teledensity growth obstacles. Our hypothesis is that there are no differences across the two continental regions:

- H3: The two continental regions, Latin America and Sub-Saharan Africa do not differ in their telecommunications stakeholders' perspectives of the strategy combinations best suited for overcoming organizational, technological, financial and geographic obstacles to teledensity growth.

Therefore, the second set of regression analysis makes use of the stepwise regression method to derive the best strategic response to each of the four obstacles to teledensity for the Latin American Region and for the Sub-Saharan Africa Region respectively. We repeated this process three times thereby generating three best-strategy-combination models for the Latin American stakeholders and another three for the Sub-Saharan stakeholders. In each case, we eliminated the strategy that contributes least to the regression model for each specific obstacle (based on the rankings provided by the stakeholders for the particular continental-region) until the point when the reduced model provided the greatest power, as measured by the  $R^2$  score, of the model.

In this case, the independent variables are defined by: (a) each strategy for overcoming a specific obstacle to teledensity growth, and (b) the interaction effects of the various strategies on overcoming a specific obstacle to teledensity growth. We then compare and contrast these models to hash out the similarities and differences in their telecommunications stakeholders' perspectives of how teledensity growth strategies impact each respective teledensity growth obstacle.

It is worth noting that this set of regressions is contingent upon the results from the first set of regressions. Where we find that the stakeholder-grouping (government v/s non government) does not influence the stakeholders' rankings of each

representative strategy, we are able to group together all respondents for that particular continental region and treat them as a single sample. Where significant differences are registered, stakeholders classified as "government stakeholders" are treated as a separate sample from those classified as "non-government" stakeholders despite the fact that both are stakeholders for the same continental region.

Concerning the effects of continent-of-vested-interest on stakeholders' rankings of the efficacy of teledensity growth strategies, where a significant effect is registered, then a comparison of the two continental regions with respect to the best strategic response to a specific obstacle to teledensity growth becomes infeasible. Where none exists, then the two continental regions can be compared to each other. Therefore the second set of regressions is conducted only when the results from the first set of regressions indicates that continent-of-vested-interest had no significant influence on stakeholders' ranking of the efficacy of teledensity growth strategies for each teledensity growth obstacle [Meso, 1999].

**VII. RESULTS**

The results for this study are presented in two parts, starting with Part A below.

***Part A: Influences of Stakeholder-Classification and Continent-of-Vested-Interest on Stakeholders' Perceptions:***

Results from the t-test of the beta values for continent-of vested interest ( $\beta_9$ ) derived from the regression analysis equations confirm that the continent-of-vested-interest impacts stakeholders' perspectives of the efficacy of strategies to the technological obstacle to teledensity growth. However, it has no significant effect on the stakeholders' perspective of the efficacy of strategies to the organizational, financial and geographic obstacles. Table 2 presents these results.

Based on the results from this first set of regression analysis, we are able to proceed and examine the differences and similarities across the two continental regions in their telecommunications stakeholders' perspectives of the strategy combinations best suited for overcoming organizational, financial and geographic obstacles to teledensity growth. However, the results indicate that such comparison is not possible for the strategies for overcoming the technological obstacle to teledensity growth. This is because the rankings by respective stakeholders are significantly biased by the continent-of-vested interest. Therefore we dropped the technological obstacle and its associated strategies from further evaluation in this study.

This result does unearth an interesting question that begs for further research – why does the continent to which a stakeholder has a vested interest so significantly influence his/her perspective of the

strategies for addressing the technological obstacle to teledensity growth? What explains this strong effect - is it differences in technological cultururation, differences in technology diffusion and adaptation,

Table 2: Analysis of H1 - Effect of Continent-of-Vested-Interest on Stakeholders' Perspectives of Efficacy of Teledensity Growth Strategies

Dependent Variable	Independent Variables	Statistical Results from Regression Equations for each Obstacle	
		$\beta_9$ Value	(P-Value)
Organizational Obstacle	Organizational Strategies	0.405	0.117
Technological Obstacle	Technological Strategies	-0.786	0.004*
Financial Obstacle	Financial Strategies	-0.305	0.151
Geographical Obstacle	Geographical Strategies	0.004	0.866

\* Continent-of-Vested-Interest has significant effect at alpha value of 0.05

Table 3: Analysis of H2: Effect of Stakeholder-Group on Stakeholders' Perspectives of Efficacy of Teledensity Growth Strategies for Each Obstacle

Regression Variables		Test for Significance			
Dependent Variable	Independent Variables	Latin America		Africa	
		$\beta_8$ Value	P-Value	$\beta_8$ Value	P-Value
Organizational Obstacle	Organizational Strategies	0.180	0.563	1.482	0.003*
Financial Obstacle	Financial Strategies	-0.396	0.136	0.871	0.020*
Geographical Obstacle	Geographical Strategies	-0.211	0.468	0.190	0.642

\* Significant effect at alpha value of 0.05

differences in the understanding and interpretations assigned to the strategies that were associated with this obstacle? Though the investigation of the underlying cause of this phenomenon is beyond the scope of this paper, we find this as a relevant and interesting question of future research that emanates from this study.

The t-tests of the beta values for stakeholder grouping ( $\beta_8$ ) derived from the regression analysis revealed that regardless of their stakeholder-group classification (government or non-government), Latin America Stakeholders did not differ in their perspective of the efficacy of respective strategies for overcoming each of the obstacles to teledensity growth. However, there were differences among the Sub Saharan Africa stakeholders based on their stakeholder-group classification. The government stakeholders differed with the non-government stakeholders significantly in their perspectives on the efficacy of strategies for organizational and financial obstacles. In addition, the betta value strategies to financial obstacles was rather large (0.871) - an additional indication that there was a rather large distance between the perceptions of government and non-government stakeholders regarding best strategies for addressing financial obstacles to teledensity growth in sub-Saharan Africa. There was no significant difference in their perspective of

strategies for geographical obstacles. Table 3 presents these results

***Part B: Comparison of Latin America's and Sub-Saharan Africa's Best Strategy-Combinations to Each Teledensity Growth Obstacles:***

Table 4 presents statistical results for the stepwise regression analysis. The table identifies a beta value ( $\beta$ ) and a p-value for each of the strategy items that remained in the final regression model for each obstacle when assessed on the basis of the stakeholders' continent-of-vested-interest. Therefore, for each teledensity growth obstacle, the collection of cells with values column representing a given region, say Latin America, indicate strategies contained in the best-strategy combination for that continental region and that particular obstacle. These best-strategy combinations are also presented in summary format in Tables 5, 6 and 7.

**VIII: DISCUSSION OF RESULTS AND IMPLICATIONS FOR FUTURE RESEARCH/PRACTICE**

**I: Contrasting the Organizational Obstacle's Best-Strategy Combinations:**

The results indicate that there is great similarity across the continental regions with respect to best strategy combinations for addressing Organizational/Policy obstacles to teledensity

growth. Both stakeholders for Latin America and those for Africa seem to agree that the best strategic

solution for addressing the organizational obstacles should center on government regulation (Table 5).

Table 4: Results from Stepwise Regression of Strategies for Each Teledensity Growth Obstacle Based on Continent-of-vested-Interest

	Strategy	Continent					
		Latin America		Sub-Saharan Africa – governmental		Sub-Saharan Africa – (non-governmental)	
		$\beta$ Value	p-value	$\beta$ Value	p-value	$\beta$ Value	p-value
<b>Organizational Obstacle</b>	Privatization / Free Enterprise					1.943	0
	Regulation—Non- Governmental						
	Regulation—Governmental	-0.959	-0.026	1.415	-0.054	4.944	-0.018
	Privatization AND Regulation—Non-Governmental						
	Privatization AND Regulation—Governmental	0.151	-0.067	-0.287	-0.053	-0.827	-0.019
	Regulation—Non- Governmental AND Regulation—Governmental	0.14	-0.063	-0.467	-0.004	-0.599	-0.031
	<b>All strategies in concert</b>	-0.023	(0.093)	0.06	-0.025	0.102	-0.029
	Strategy	Continent					
		Latin America		Sub-Saharan Africa – governmental		Sub-Saharan Africa – (non-governmental)	
		$\beta$ Value	p-value	$\beta$ Value	p-value	$\beta$ Value	p-value
<b>Financial Obstacle</b>	Domestic-Generated Funding	-0.818	-0.049	19.48	0		
	Foreign-Generated Funding	-0.873	-0.026				
	Private Sector Investment			8.997	0		
	Domestic-Generated Funding AND Foreign-Generated Funding	0.172	-0.023	-1.7	0		
	Domestic-Generated Funding AND Private Sector Investment					-0.153	-0.078
	Foreign-Generated Funding AND Foreign-Generated Funding			-2.949	0	-0.121	-0.03
	<b>All strategies in concert</b>			0.261	0	0.037	-0.023
	Strategy	Continent					
		Latin America		Sub-Saharan Africa			
		$\beta$ Value	p-value	$\beta$ Value	p-value		
<b>Geographical Obstacle</b>	Wireless Communication			0.687	-0.008		
	Rural Development						
	Public Telecommunications Access	0.498	-0.056				
	Wireless Communication AND Rural Development	-0.04	-0.082	-0.134	-0.026		
	Wireless Communication AND Public Telecommunications Access						
	Rural Development AND Public Telecommunications Access						
	<b>All Strategies in Concert</b>			0.017	-0.015		

Note: Each COLUMN represents a single regression equation. A Blank cell indicates that the variable did not make it into the final regression model.

Table 5: Stakeholder Perspectives of Best Strategy Combination for Addressing Organizational Obstacle to Teledensity Growth

Continental Region	CONTENTS OF BEST STRATEGY COMBINATION					R <sup>2</sup> Value
	Privatization / Free Enterprise	Regulation— Governmental	Privatization/ Free Enterprise AND Regulation— Governmental	Regulation— Non-Governmental AND Regulation— Governmental	All three strategies in concert	
Latin America		+β <sub>3</sub> X <sub>3</sub>	+β <sub>5</sub> X <sub>1</sub> X <sub>3</sub>	+β <sub>6</sub> X <sub>2</sub> X <sub>3</sub>	+β <sub>7</sub> X <sub>1</sub> X <sub>2</sub> X <sub>3</sub>	0.093
Sub Saharan –Africa (governmental)		+β <sub>3</sub> X <sub>3</sub>	+β <sub>5</sub> X <sub>1</sub> X <sub>3</sub>	+β <sub>6</sub> X <sub>2</sub> X <sub>3</sub>	+β <sub>7</sub> X <sub>1</sub> X <sub>2</sub> X <sub>3</sub>	0.452
Sub Saharan-Africa (non-governmental)	+β <sub>1</sub> X <sub>1</sub>	+β <sub>3</sub> X <sub>3</sub>	+β <sub>5</sub> X <sub>1</sub> X <sub>3</sub>	+β <sub>6</sub> X <sub>2</sub> X <sub>3</sub>	+β <sub>7</sub> X <sub>1</sub> X <sub>2</sub> X <sub>3</sub>	0.351

The best-strategy-combination model derived from the responses of the Latin American Stakeholders proposes that the greatest impact on the organizational obstacle derives from governmental regulation, in addition to the interaction effects of privatization and governmental regulation, governmental and non governmental regulation working in concert, and all three strategies working in concert. The perspectives of both the governmental and non-governmental Stakeholders for the sub-Saharan Africa region are similar to those of Latin America’s stakeholders on this issue. The slight exception being that the non-government stakeholders direct effects of privatization/free-enterprise are also important in impacting the organizational obstacles to teledensity growth.

Our inference from this observation is that the similarity in perspectives to addressing the organizational obstacle to teledensity growth evidenced in stakeholders for both continental regions is a result of (and thus a reflection of the successes for) the consistent push for liberalization and privatization of the telecommunications sectors in nation states [ITU, 2006]. During the most part of the 1990s and the early 2000s international development agencies, funding organizations and the international telecommunication union (ITU) has been consistent in its message to nation states that liberalization and privatization of the telecommunications sectors would yield rapid and teledensity growth.

The observation that stakeholders from both regions seem to favor government-centric regulation is a reflection of the social and/or national security value placed on telecommunications infrastructure by nations in these regions. Telecommunications infrastructure may still be viewed as a strategic

national resource that should be well protected while being readily accessible to all. In this school of thought, the nation should not open itself to the risk of having the infrastructure’s control dominated by a few private interests. Thus this may be a reflection of the view, common in most developing countries, that government-centered regulation is the surest way of ensuring that the nation’s telecommunications infrastructure serves the greatest common good to the largest pool of a country’s citizenry.

The observation among non-government stakeholders for Sub-Saharan Africa that an effective strategy should include a significant dose of privatization/free-enterprise, may be a reflection of the non-government stakeholders’ reaction to the dismal performance of the state-controlled telecommunications organizations in this region. It may also be a reflection of the frustrations that private enterprises experienced while attempting to set up operations in most of these countries. The evidence supporting this may be the slow pace at which countries in SSA open up their telecommunications markets when contrasted to countries in other regions of the world. We should not though, that once liberalized, the markets in these countries experienced meteoric increases in the diffusion of telecommunications devices and the expansion of their telecommunications infrastructure [Mbarika, 2002].

**II: Contrasting the Financial Obstacle’s Best-Strategy Combinations:**

There was a marked difference in the best-strategy combinations for addressing the financial obstacle to teledensity growth proposed by stakeholders for Latin America and those for Sub Saharan Africa (Table 6). While Latin America’s

stakeholders hold the perspective that foreign funding and domestic funding are two somewhat independent avenues for addressing the financial obstacle to teledensity growth, the perspective of stakeholders

for Sub-Saharan Africa is that these two are interconnected and/or interrelated approaches which yield the best results when they are pursued in concert rather than as two separate strategies.

Table 6: Stakeholder Perspectives of Best Strategy Combination for Addressing Financial Obstacle to Teledensity Growth

Continental Region	CONTENTS OF BEST STRATEGY COMBINATION							R <sup>2</sup> Value
	Domestic-Generated Funding	Foreign-Generated Funding	Private Sector Investment	Domestic-Generated Funding AND Foreign-Generated Funding	Domestic-Generated Funding AND Private Sector Investment	Domestic-Generated Funding AND Foreign-Generated Funding	All three strategies in concert	
Latin America	+β <sub>1</sub> x <sub>1</sub>	+ β <sub>2</sub> x <sub>2</sub>		+ β <sub>4</sub> x <sub>1</sub> x <sub>2</sub>				0.074
Sub Saharan – Africa (Gov.)	+β <sub>1</sub> x <sub>1</sub>		+ β <sub>3</sub> x <sub>3</sub>	+ β <sub>4</sub> x <sub>1</sub> x <sub>2</sub>		+β <sub>6</sub> x <sub>2</sub> x <sub>3</sub>	+β <sub>7</sub> x <sub>1</sub> x <sub>2</sub> x <sub>3</sub>	0.589
Sub Saharan-Africa (Non-Gov.)					+β <sub>5</sub> x <sub>1</sub> x <sub>3</sub>	+β <sub>6</sub> x <sub>2</sub> x <sub>3</sub>	+β <sub>7</sub> x <sub>1</sub> x <sub>2</sub> x <sub>3</sub>	0.151

These results may be an indication that financial strategies may need to be localized to the specific continental regions of the world since the context in which they are applied seems to vary from region to region. They may also be an indication of difference in perspective of financial strategies across the two regions. Should the former be the case, then the result provides some evidence for why similar financial strategies applied by development agencies to different regions of the world yield diametrically different results.

Should the later be the case, then results indicate that success of financial strategies is predicated upon the meanings or interpretations ascribed to these strategies; and that such interpretations can vary from one region of the world to another. Therefore, in addition to simply proposing a given set of ICT development strategies, development agencies and ICT stakeholders need to take into consideration the local interpretations ascribed to these strategies. Such interpretations may influence the directionality and efficacy of the strategies.

Events in the two regions seem to give credence to this observation. For one, while the privatization of the telecommunications sector via the almost-total acquisition of telecommunications firms by foreign entities seemed to have progressed quickly and without much ado in Latin America, this

approach to privatization was fraught with difficulties in almost all Sub-Saharan African countries. To-date, a significant number of Sub-Saharan African countries still exhibit a great proportion of government ownership and/or control of the corporations in the telecommunications sector. This is true even where privatization had been allowed to take place. For example, the government still owns significant shares in the leading cellular telephony companies and in the land-line telephone providers in a number of these countries – a clear reflection in this region of the world, that foreign and local funding should be used concurrently in financing telecommunications infrastructure, with most of the local funding coming from the government.

**II: Contrasting the Geographical Obstacle’s Best-Strategy Combinations:**

With respect to the best strategy combinations for addressing the geographical obstacle, results (Table 7) indicate that Sub-Saharan Africa’s stakeholders perceive wireless communications enhancement to be the epicenter of the strategic solution for overcoming geographical barriers to teledensity growth. Results from the stepwise regression analysis indicate that these stakeholders hold the perspective that the greatest impact on the geographical obstacle is derived from the direct effects of wireless communications as well

Table 7: Stakeholder Perspectives of Best Strategy Combination for Addressing Geographical Obstacle to Teledensity Growth

Continental Region	CONTENTS OF BEST STRATEGY COMBINATION				R <sup>2</sup> Value
	Wireless Communication	Public Telecommunications Access	Wireless Communication AND Rural Development	All three Strategies in Concert	
Latin America		+ $\beta_3 X_3$	+ $\beta_4 X_1 X_2$		0.047
Sub Saharan-Africa	+ $\beta_1 X_1$		+ $\beta_4 X_1 X_2$	+ $\beta_7 X_1 X_2 X_3$	0.219

as the interaction effects of (a) the wireless communications strategy and the rural development strategy, and (b) the interaction effects of all three strategies for addressing the geographical obstacle.

Stakeholders for Latin America, however, place heavier emphasis on the leveraging of public telecommunications access. The regression results reveal that these stakeholders hold the perspective that direct effects of the public telecommunications access strategy as well as its interaction effects with wireless communications yields the greatest impact on the geographical obstacle to teledensity growth. Practical support for this observation is evidenced in the meteoric growth in cellular telephony within the two continental regions. Much literature on the subject of the digital divide in Sub Saharan Africa regions also ascribes cellular telephony as a practical, feasible and perhaps most potent solution to closing the digital divide gap. The results also send a message about the state of fixed-line telecommunications infrastructure in this region. There is a realization that expanding the fixed-line networks to cover vast geographic territories is less feasible and less tenable than the option of implementing cellular networks. Therefore, it is not a surprise that Sub-Saharan Africa stakeholders strongly advocate a wireless telephony-centric strategy.

The teledensity indices for Latin America, though low, were significantly better than those for Sub-Saharan Africa prior to the advent of cellular telephony and wireless communications. This may be one reason why Latin American stakeholders perceive the geographical obstacle problem as the lack of universal access rather than the lack of infrastructure. Therefore, unlike in Sub-Saharan Africa where the strategy recommended is one that expands the infrastructure's reach, Latin American stakeholders hold preference for a strategy that would make infrastructure accessible to more citizens – that is, by making access more affordable. Emphasis is thus on public access rather than on wireless telephony.

The responses by stakeholders regarding geographic obstacles once again reflects that the best

approach to overcoming geographic obstacles is by employing strategies that have been customized to the local conditions within a given region.

### IX. CONCLUSIONS AND FUTURE RESEARCH

It is worth-noting that although the stakeholders may have agreed on the viability of a given strategy it does not necessarily mean such a strategy is the best approach for these developing nations. Other potential impeding factors common to such countries such as corruption must be addressed. Other relevant development theories such as Sen's Capabilities Approach and Cognitive Constructivism will be explored in future studies (Musa et al., 2006). However, such is beyond the scope of this study.

This study examines a comprehensive set of teledensity-improving strategies found in the literature by investigating the similarities and differences in stakeholder perspectives for Latin America and Sub-Saharan Africa. We attempt to provide a greater understanding of strategies to overcome the low teledensity problems in these two regions of the world and hashing out those strategies that may be "global" in appeal from those which may have a local focus.

Considering the realization that the continent-of-vested interest did not bias the stakeholders' rankings of the efficacy of select strategies, save for those associated with technological obstacle to teledensity growth, we were able to contrast the best-strategy combinations derived from the study's two samples. The results revealed that while there was great similarity in perspectives of strategies for organizational obstacles to teledensity growth, this was not the case for financial and geographical obstacles. This is an indication that one-size strategy may not fit all regions of the world. Rather, strategic response to teledensity obstacles may be more specific to the contexts and unique problems that define each different global region. However, there seems to be an emerging, if not underlying commonality in how to respond most effectively to organizational teledensity growth obstacles. This may be a reflection

of emerging “best-practices” or standards as the various countries of the world converge in their approaches to organizing and governing the telecommunications infrastructure. It is difficult to predict if the same result will be forthcoming in the approaches for addressing the financial, geographical and/or technological obstacles. These obstacles may be more sensitive to local contexts than is the organizational set of obstacles. Therefore, effective strategy formulation or response may call for localized strategic approaches.

We caution, though, that this study examined differences in stakeholder’s perceptions, not factual efficacy of the teledensity strategies. Therefore, the inferences of this study ought to be internalized with this limitation in mind.

## REFERENCES

- [1] Bernt, P. and Weiss, M. (1993), *International Telecommunications*. Carmel, Indiana: Sams.
- [2] 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.
- [3] ITU (International Telecommunication Union) (2006), Trends in Telecommunication Reform 2004-2005: Licensing in an Era of Convergence (6th Edition), Geneva: Switzerland: ITU
- [4] 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.
- [5] 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
- [6] Mbarika, V. (2001), Africa's Least Developed Countries' Teledensity Problems and Strategies. Yaoundé, Cameroon: ME & AGWECAMS Publishers,
- [7] 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.
- [8] Mbarika, V. and Meso, P. (2004), A Disconnect in Stakeholders’ Perceptions from Emerging Realities of Teledensity Growth in Africa’s Least Developed Countries. *Journal of Global Information Management*. Vol. 12, #3, July-Sept 2004.
- [9] McCoy S., and Mbarika V., (2005), “Global Diffusion of the Internet VII- Teledensity Growth Strategies for Latin America: The Case of Colombia and Ecuador,” *Communications of the Association for Information Systems*, 16, pp. 26-56.
- [10] 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.
- [11] Meso, P. (1999), “Relating Social Development to Information Infrastructure in the Least Developed Countries,” *Proceedings of the Annual National Conference of the Decision Sciences Institute*, New Orleans, Louisiana.
- [12] Musa, P.F., (2006), “Making a Case for Modifying the Technology Acceptance Model to Account for Limited Accessibility in Developing Countries,” *Information Technology for Development (ITD)*, Vol. 12, No. 3, summer 2006, pp. 213-224.
- [13] Musa, P.F., Mbarika, V., Meso, P., (2006), “Integrating Capability Approach and Cognitive Constructivism to Study Technology Acceptance in Developing Countries”, *Proceedings of Americas Conference on Information Systems (AMCIS)*, August 4-6, Acapulco, Mexico.
- [14] Odedra, M., Lawrie, M., Bennett, M., & Goodman, S. (1993), “Sub-Saharan Africa: A Technological Desert,” *Communications of the ACM*, 36(2, February), pp. 25-29.
- [15] Saunders, R. J., Warfbrd, J. I., & Welienius, B., (1994), *Telecommunications and Economic Development (2nd ed.)*, Baltimore, MD: John Hopkins University Press.
- [16] Wellenius, B. (1984), “Telecommunications in Developing Countries,” *Finance and Development*, Vol. 21, September, pp 33-46.