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TELECOMMUNICATION INVESTMENT IN ECONOMICALLY DEVELOPING COUNTRIES

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Abstract

This study looked at two research questions: Are economically developing countries spending comparable percentage of their budget, compared to industrialized nations, on telecommunication investment? What telecommunication investment framework should economically developing countries use to spur economic activities? We used annual telecommunication investment as percent of Gross Domestic Product as a surrogate for investment budget allocation. Ten year data from the 2005 World Telecommunication Indicator Database by ITU were used for analysis. Our finding indicates that the percentage of GDP allocation by economically developing countries is comparable, in many cases higher, than industrialized nations. This paper argues that even after spending a higher proportion of their GDP economically developing countries are not investing enough money to realize economic benefits that derive from telecommunication investment. We propose a new framework, community focused network investment instead of individual focused network investment, to spur economic activities in economically developing countries.

Keywords: telecommunication investment, economically developing countries, telecommunications

Introduction

Can telecommunication investment help economically developing countries (EDCs) to advance? Prior research indicates that telecommunication investment increases growth dividend (Roller and Waverman, 2001), facilitates economic growth (Waverman, Meschi, and Fuss, 2005), combats poverty (Calderon and Serven, 2004), and promotes expansion in economic activities (World Bank, 1991). Other researchers have also found relationship between development and telecommunication investments in economically developing countries (Alleman et al., 1994). Roller and Waverman (2001) also found that telecommunication investments spur economic benefits in economically developing countries.

A high correlation between telecommunication investment and Gross Domestic Products (GDP) was found (Saunders, 1982; Saunders et al., 1983, 1994; Gille, 1986). Further more, a positive relationship between teledensity (number of main telephone lines for every one hundred inhabitants) and GDP per capita was established (Mbarika, et al., 2003).

There is a preponderous amount of research that shows economic development related to telecommunication investment. Armed with this wealth of information EDCs should be able to use telecommunication investment to bridge the economic gap. However, a decade after the Internet revolution, EDCs have not leaped out of economic stagnation. Are EDCs spending enough money on telecommunications? Prior studies have suggested that EDCs may not be putting enough financial investment because telecommunications authorities are state enterprises in most countries and hence subject to standard governmental budget practices, telecommunications must compete for budget allocations from the state along with all other bureaucracies, or government authorities do not understand the economic benefits (Alleman, et al., 1994).

These findings imply that EDCs are not spending adequate level of investment in telecommunication. Are EDCs allocating adequate budget for telecommunications? What proportion of their budget are EDCs allocating for telecommunication investment? Are the proportions of EDC telecommunication comparable to those in industrialized nations? If EDCs are already spending comparable amount, compared to industrialized countries, are the investment frameworks appropriate for EDCs? What type of telecommunication investment framework should EDCs follow?

To address these questions this paper focuses on two research questions: First, are EDCs spending comparable percentage of their budget, compared to industrialized nations, on telecommunication investments? Second, what telecommunication investment framework should EDCs use to spur economic development?

Methodology

We used Annual Telecommunication Investment (ATI) as a percent of GDP to be a surrogate for telecommunication investment budget allocation in a country. ATI is the annual expenditure associated with acquiring ownership of property and plant used for telecommunication services. GDP reflects the economic strength of a nation. We used ATI as a percent of GDP (ATI/GDP) to allow comparison between countries. Further statistical scrutiny is needed to validate the accuracy of the ATI/GDP measure.

ATI and GDP data from the 2005 World Telecommunication Indicator Database are used for this study (ITU, 2005). ITU (International Telecommunication Union), a department of the United Nation, tracks global data for telecommunication indicators through annual surveys of over 200 countries and territories. The ITU data are collected from telecommunication ministries, regulators, and operators.

We looked at 10 year data, 1993 to 2002, from 204 countries; 109 EDCs and 95 industrialized countries. Classification for EDCs was taken from the 2005 World Bank classification (World Bank, 2005a). Based on the World Bank classification 109 countries (53%), 59 low income countries and 54 lower middle income countries were grouped as EDCs for this study. Ninety-five countries (47%), 40 upper middle income countries and 55 high income countries were grouped as industrialized countries.

The 2005 World Telecommunication Indicator Database (ITU, 2005) we used had ATI data through 2003. However, only 29% of the countries reported ATI data for 2003; about half of these countries did not have complete data for the last 10 years. Therefore, we took the 10 year data from 1993 to 2002 for this study. From the 204 countries we found 87 countries with data for all 10 years under consideration. The remaining 127 countries were missing data for multiple years and hence excluded from this study.

The 87 countries considered in this study consisted of 41 EDCs (47%) and 46 industrialized countries (53%). The representation of EDCs in our sample study is lower than the World Bank classification for EDCs, 53%. This reflects the challenges of data collection.

We calculated the average investment over 10 years using the ATI/GDP ratio. We ranked countries based on their average 10 year investment.

Results

The 10 year average ATI/GDP ratio was used to rank the 87 countries in our study. Thirty-seven countries invested more than 1% of their GDP on telecommunication. Majority of these countries, 54%, were EDCs. This showed that on the average EDCs investment in telecommunications was higher than industrialized countries.

The top 10 countries, based on a 10 year average annual telecommunication investment, are shown in Table 1. The 2002 ATI and GDP data along with the economic classification for countries is indicated in Table 1. EDCs are labeled as A or B in the "Economy" column. Sixty percent of the top 10 countries in average telecommunication investment were EDCs. The United States, the country with the largest dollar amount on annual telecommunication investment, is used as a benchmark.

As shown in Table 1 the United States, largest ATI spender, ranked 78th out of the 87 countries studied here. The combined spending of the top 10 countries is only 12% of what the United States alone spends. However, the

ranking in this study is based on percentage of GDP allocated to telecommunication. The United States with a large ATI and large GDP spends only one half of one percent of its GDP on ATI.

Table 1: Average ATI/GDP for TOP 10 countries

Rank ¹	Country	Economy ²	2002 ATI (\$millions)	2002 GDP (\$millions)	10 year Average ATI/GDP
1	Azerbaijan	B	8	6,194	0.439
2	Gabon	C	11	4	0.234
3	Honduras	B	52	6,565	0.024
4	Cape Verde	B	14	633	0.023
5	Jamaica	B	136	8,419	0.021
6	Costa Rica	C	249	16,836	0.020
7	Gambia	A	3	358	0.020
8	China	B	25,039	1,236,690	0.018
9	Latvia	C	91	8,378	0.017
10	Czech Republic	C	810	69,505	0.017
78	United States	D	34,818	10,445,600	0.005

¹ Rank based on 10 year average telecommunication investment as a percent of GDP

² Economic classification: A = Low-income economies; B = Lower-middle-income economies; C = Upper-middle-income economies; D = high income economy

The 10 year trend for ATI/GDP spending for the top 10 countries and United States is shown in Table 2. During the 10 years the top 10 countries spent consistently higher percentage of their GDP year after year, except two. The two exceptions were Azerbaijan and Gabon. During the year 2000 Azerbaijan reportedly spent 436% of GDP on telecommunication. Gabon also spent higher amount, 229% of GDP in 2002. The result in the other nine years for Azerbaijan and Gabon, however, shows that they spent less than 1% of GDP annually. Further study is needed to investigate if reporting error had occurred or if these two countries invested amounts higher than GDP. If Azerbaijan and Gabon's investment is in fact higher than GDP, then further study is needed to understand the impact of these investments.

Table 2: 10 year Trend for ATI/GDP

	Econ	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	Avg.
Azerbaijan	B	0.001	0.005	4.366	0.004	0.003	0.002	0.001	0.001	0.001	0.001	0.439
Gabon	C	2.291	0.001	0.009	0.005	0.002	0.007	0.005	0.008	0.008	0.008	0.234
Honduras	B	0.008	0.004	0.008	0.020	0.012	0.038	0.028	0.054	0.024	0.040	0.024
Cape Verde	B	0.023	0.021	0.024	0.027	0.021	0.032	0.031	0.010	0.016	0.023	0.023
Jamaica	B	0.016	0.017	0.019	0.018	0.018	0.018	0.023	0.026	0.027	0.024	0.021
Costa Rica	C	0.015	0.014	0.026	0.029	0.032	0.029	0.022	0.017	0.011	0.009	0.020
Gambia	A	0.010	0.017	0.015	0.034	0.030	0.010	0.007	0.025	0.009	0.040	0.020
China	B	0.020	0.026	0.025	0.019	0.019	0.014	0.013	0.017	0.014	0.012	0.018
Latvia	C	0.011	0.011	0.010	0.012	0.020	0.014	0.011	0.027	0.029	0.029	0.017
Czech Republic	C	0.012	0.021	0.023	0.015	0.021	0.027	0.018	0.014	0.010	0.009	0.017
United States	D	0.003	0.007	0.008	0.006	0.006	0.003	0.003	0.003	0.003	0.004	0.005

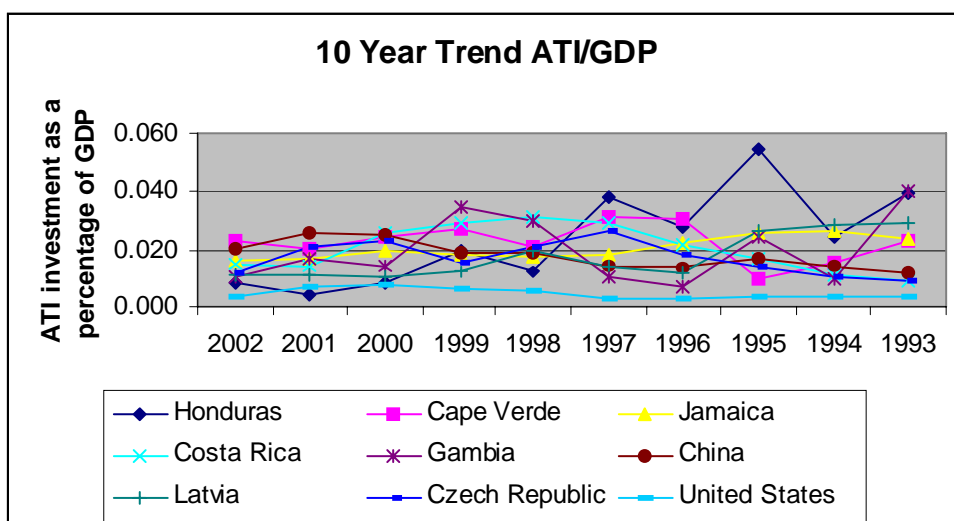


Figure 1: Ten Year ATI/GDP Trend

A graphical representation of the 10 year spending for nine countries, eight from the top 10 and the United States, is shown in Figure 1. Azerbaijan and Gabon, the two countries from the top 10 that did not have consistent above 1% investment in the 10 year period under study were omitted from Figure 1. Figure 1 shows that the represented countries investment between 1% and 3%, consistently higher than the United States.

Implications

Based on the results shown above EDCs are spending a higher percentage of their GDP when compared to industrialized nations. Two of the reasons why industrialized nations are spending less than EDCs may be, first, industrialized nations have already established the basic infrastructure for telecommunication and hence require a smaller amount for ongoing maintenance. Second, industrialized nations have significantly larger economies and hence the smaller percentage of GDP may still be larger than what EDCs are spending. This paper does not try to imply that EDCs are spending higher than industrialized nations. In fact telecommunication investments need significant financial input and the small investments by EDCs may not be enough to spur economic development.

This paper looked at annual telecommunication investment as a percent of GDP to measure budget allocations. Based on our results we conclude that EDCs are allocating as much percentage of their GDP on telecommunication investments as industrialized nations. In fact, our preliminary results show that EDCs are spending proportionally higher amounts of their GDP on telecommunication investments.

The current approach for assessing telecommunication investments is focused on how much access individuals receive, i.e. number of main telephone lines per 100 inhabitants. These measures imply that telecommunication investment should focus on individual access. Current assessments are that EDCs need to invest at least \$8 billion dollars to increase the number of main telephone lines from 0.29 to 1.0, from the current 1 telephone per 300 inhabitants to 1 telephones per 100 inhabitants (Mbarika, et al., 2003; Hudson, 1997), still a meager amount compared to industrialized nations. Research also indicates that EDCs will have a 30% shortfall of this required funding (Hudson, 1997). One option is to look for funding sources that will augment this shortfall. Even if this approach works the level of penetration will still be dismal. We argue that changing the current approach for telecommunication investment in EDCs may provide better results.

EDCs, as shown above, are already spending a higher percentage of their GDP on telecommunication investments. With the many competing basic needs EDCs face it is unlikely and may not be practical to expect further increase in the telecommunication budget allocation. Unless a critical mass in telecommunication investment is achieved the expected economical development may not be achieved (Roller and Waverman, 2001). Achieving the needed critical mass in telecommunication investment is a daunting task for EDCs. Given the significant investment needed and the limitations of EDCs we propose that EDCs focus on community access over individual access, see Figure 2.

Many EDCs have a large rural community. If telecommunication infrastructure is to accelerate economic activities in EDCs it should reach the vast rural communities. Installing telecommunication access to individual households in EDCs is not financially practical. Such approaches in EDCs may not reach individuals beyond the urban areas. Instead we propose to use the Telecommunication Investment Framework for Economically Developing Countries shown in Figure 2.

	Network	Information
Community	I	II
Individual	III	IV

Figure 2: Telecommunication Investment Framework for Economically Developing Countries

Our framework has four steps to realize economic activities from telecommunication investment in EDCs. Step I: the first step in the framework is to focus on network access for communities. Individual access, prevalent in industrialized nations, where individuals get telecommunication access including telephone and Internet access, requires a significant financial investment. Instead we propose that telecommunication investments focus on providing community access where large numbers of people come to a community center to use telecommunication services, for example, creating network access at community centers (Negash, 2005).

Step II, information access for communities, uses the network infrastructure built in Step I to provide information services to communities. This shared network approach will reach a large number of individuals and reduces per person costs. Telecommunication investment focused on community access can quickly reach a large segment of the population which may spur economic development.

Economic activities from Step I and II may trigger larger investments that will lead to Steps III and IV. In Steps III and IV the focus is extending telecommunication services to individuals. Step III will build the necessary network infrastructure for individual households. Step IV will provide information access for individuals.

Conclusion

We conclude that EDCs are already spending a large proportion of their budget on telecommunication investments. But the telecommunication investments are not reaching the needed critical mass to spur economic development. We propose to change the investment framework from individual focus to community focus to spur economic development in EDCs.

Telecommunication investment dollars across countries vary depending on the size of their economy. The dollar amount invested by high income countries is significantly larger than low-income countries. However, the ATI/GDP ratio indicates proportionally higher investment by economically developing countries. Revisiting our research question: How strongly do economically developing countries emphasize the importance of telecommunication? Looking at the above analysis economically developing countries spend higher proportion of their GDP on telecommunication compared to industrialized countries. Therefore we conclude that economically developing countries strongly emphasize the importance of telecommunications.

Telecommunication investments have to reach a critical level before significant economic development can be achieved (Roller and Waverman, 2001). As indicated in this paper economically developing countries are already spending a higher proportion of their GDP on telecommunication investments. Achieving the critical level of telecommunication investments requires an even larger proportion of their meager GDP. Instead policies on telecommunication investment should focus on community access. Telecommunication investments that focus on community access centers including libraries, community-based centers, and internet café may provide better economic development (Negash, 2005).

Understanding the emphasis countries place on their telecommunication investment is important in guiding policy. We believe the issues involved in EDCs are different from industrialized nations and a different framework for telecommunication investment is needed. We have proposed one such framework. Additional research in this area is needed to guide telecommunication investment policy on how best to allocate the limited funds that spur economic development.

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