Achieving Economic Development by

Bridging the Digital Divide

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3) Introduction

The main goal of all economies and all governments is to achieve development. There are many regions in the world that are not considered developed. This includes countries like many countries in Asia, Africa and also parts of developed countries like poor underdeveloped areas in the US and in Europe. Today, information and communication technologies (ICT's), including the Internet, have been transforming the global economy and society. The advent of newer technologies has also resulted in a widening global and national digital divide. This paper presents and analyses the viability of bridging the digital divide as a means of attaining higher levels of development. Unfortunately "because of its complexity, experience in empirically defining this relationship between ICT and economic development has proved to be significantly difficult" (Gills, 2002). Therefore the paper is not an empirical study but more of a presentation focusing on what is possible and what has been done.

a) What is Economic Development

Economic development is more than just an increase in the per capita income. It also reflects the increase in the well being of the population, increase use of technology, higher living standards, higher literacy rates, lower infant mortality, and increase in the share of industry in the overall GDP among many other factors. Therefore economic development can be perceived as a positive change in one or more of these factors that lead to better living standards for all persons in the country (Perkins, 2001).

4) What is the Digital Divide?

A definition of the digital divide seems necessary. The American Library Association defines the digital divide as "Disparities/Differences based on economic status, gender, race, physical abilities, and geographic location between those who have or do not have:

1. Access to information, the Internet, and other information technologies and services (ICT's).
2. The skills, knowledge and abilities to use information, the Internet, and other technologies (ICT's)" (Saundra 2000).

Though the above definition addresses the digital divide in general the global digital divide and the national divide are significantly different.

a) Nationally

The national digital divide stems from the fact that different demographical sectors of society have different access and usage opportunities. These different opportunities contribute to some sectors having access and others not. The following figures reported on "Falling Through the Net" portray the divide in the US for Internet access and usage.

- 51% of all U.S. homes had a computer; 41.5% of all U.S. homes had Internet access
- White (46.1%) and Asian American & Pacific Islander (56.8%) households continued to have Internet access at levels more than double those of Black (23.5%) and Hispanic (23.6%) households.
- 86.3% of households earning $75,000 and above per year had Internet access compared to 12.7% of households earning less than $15,000 per year.

- Nearly 65% of college graduates have home Internet access; only 11.7% of households headed by persons with less than a high school education have Internet access (Digital 2001).

A closer analyzes of the report shows that as income increases the impact of the other factors affecting the digital divide diminish. Irrespective of race, education or neighborhood, if the income is significantly high then people are very likely to have access. Also, African Americans and Hispanics who come from underdeveloped neighborhood and people with low income and education who live in underdeveloped neighborhoods have less access to the Internet. In contrast, overall "Internet use is increasing for people regardless of income, education, age, races, ethnicity, or gender" as more and more American are gaining access and using the Internet (Digital 2001). As the report shows, thought the divide have been increasing, the overall access rates in each group have been increasing (U.S. 1999). Unfortunately the same does not hold globally.

b) Globally

The following figures highlight the depth of the global digital divide.

- 41% of the global online population is in the United States & Canada
- 27% of the online population lives in Europe, the Middle East and Africa
- (25% of European Homes are online)
- 20% of the online population logs on from Asia Pacific
- (33% of all Asian Homes are online)
- Only 4% of the world's online population are in South America

Source: First Quarter 2001 Global Internet Trends, Neilsen/Netratings (Digital 2001)

It is clear that many developing countries in the world are not connected to the Internet. Many of the countries in Africa and South America and in poorer parts of Asia have had no opportunity to access the Internet. The International Labor Organization's "World Employment Report 2001: Life at Work in the Information Economy", reports that though there is a technology revolution taking place more and more workers are unable to find jobs or gain access to the new technological resources including the Internet. Furthermore the report also finds that, due to the different speeds that technology spreads among countries "the information and communications technology (ICT) revolution is resulting in a widening global digital divide" (Pastore 2001). A deeper investigation reveals that there seems to be a connection between regions and social classes without access to ICT's and lack of development.

5) Correlation Between the Digital Divide and Economic Underdevelopment

There is a correlation between the digital divide and Economic Development. It was this perceived connection that led to the research behind this paper. On analyzing the global and national data for digital divide and the data for development levels in different demographic areas a pattern emerges. There is a correlation between the development level of a region or demographic sector and their access and usage of the Internet and ICT. People from regions of low development and demographic sectors that fall into low development sectors usually have low access rates to the Internet and other ICT's. Though it is hard to prove a casual relationship, the correlation leads to wonder if it will be possible to increase the development of these sectors/regions by helping them bridge the digital divide. Later on I discovered that the,

"connection between the expansion of information communication technologies and economic development is currently receiving considerable attention by practitioners, policy makers, researchers and funding organizations" (Gills 2002). Therefore there seems to be a correlation that is worth investigating. The start should be by studying the factors hindering economic development.

6) Factors Hindering Economic Development

The paper focuses on three aspects that hinder economic development, namely, education, technology and instability. Though these are not the only reasons hindering economic development they seem most likely to be eliminated by bridging the digital divide.

a) Education

Education plays a major role in the amount of development that can be achieved. In the extended Solow model with technological change "increased education levels are expected to result in an increase in productivity leading to an increase in Economic development"(Perkins 2001). At the same time a lack of education means that people are not able to learn about newer methods that would increase efficiency and lower costs. Furthermore uneducated workers will only provide a low skilled work force preventing foreign investors from investing in the country.[1] Recent studies have shown that the spillover effects caused by the increase in education also play a major part in increasing the development levels of a country (Perkins, 2001).

[1] If foreign investors do invest it's due to the availability of cheap labor and this actually hinders development because the investors are only using the region or country as a labor pool. They will not be interested in developing the country because any development might eliminate the cheap labor pool.

There is a strong correlation between education levels and individual and societal income. Thus as more of the population receive education the societal income should rise leading to economic development. The following graph illustrates how the income increases with different education levels.

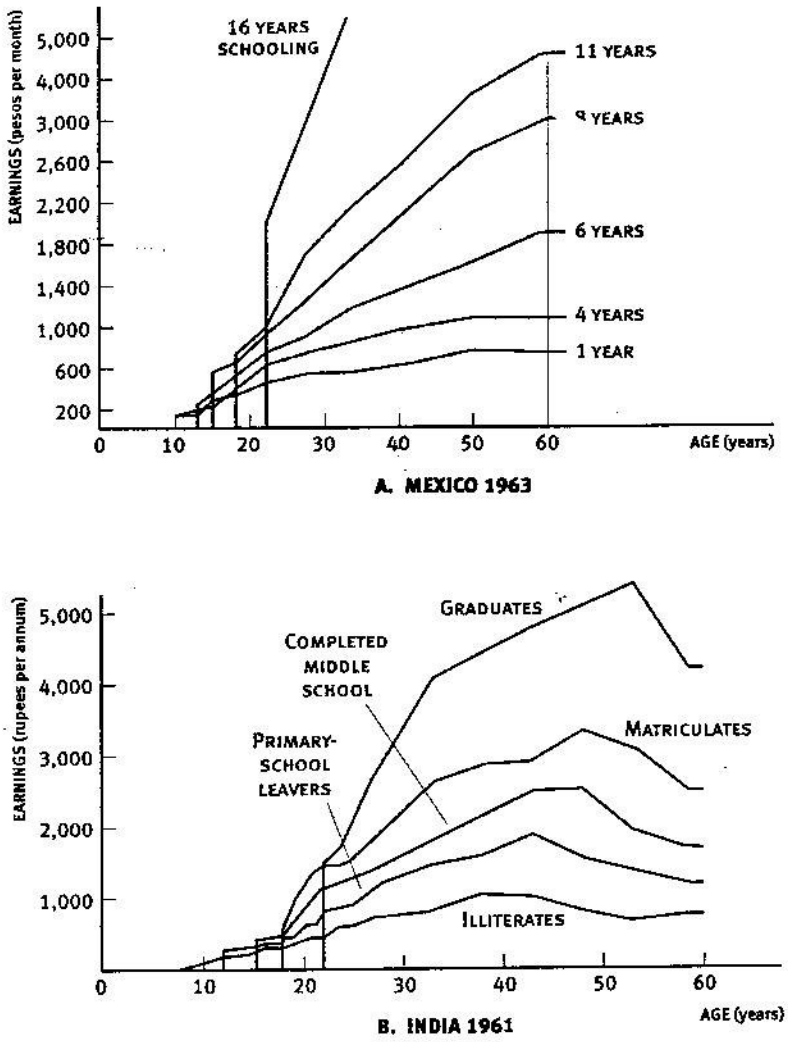

FIGURE 9–1 AGE EARNINGS PROFILES IN MEXICO AND INDIA. The lines of the graph represent mean earnings at different ages of people with varying amounts of formal education. On average, people who stay in school longer earn higher incomes.
Sources: Martin Carnoy, "Rates of Return to Schooling in Latin America," *Journal of Human Resources* (Summer 1967), 359–74; and M. Balug, R. Layard, and M. Woodhall, *Causes of Graduate Unemployment in India* (Harmondsworth, UK: Allen Lane, Penguin Press, 1969), p. 21.

(Perkins 2001).

Higher levels of income will lead to higher health standards and more investments and more spending. Therefore the higher levels of education will lead to higher of levels of development and the lack of proper education opportunities is a hindrance to development.

b) Technology

Lack of technology is another major factor hindering economic development in many developing countries. New technology will lead to increase efficiency and lower of cost in many industries. Since most developing countries are limited to exporting primary agricultural goods or raw materials their technological sector isb undeveloped. Also the large labor resources mean that many technologically inclined industries, such as manufacturing, have not been pursued. Consequently this has led to most developing countries shying away from the use of technology and this has led to missing opportunities of increasing efficiency and reducing cost. This is clearly affirmed by Calaoustous Juma's statement, on explaining the contemporary poor growth in Africa, when he says, "Low level of technological competence and exclusive dependence on exploitation and dependence on sale of natural resources"(Juma 2000).

In contrast to developing countries many developed countries are countries that export technology intensive goods and many of these countries rely on capital-intensive manufacturing methods to increase efficiency and cut costs. Looking at the Asian tigers we can see how it is possible for developing countries, based on labor-intensive industries to increase their development rapidly by using technology and improved infrastructure. At the beginning of the 1960's the four East Asian Tigers, Hong Kong, South Korea, Taiwan and Singapore were on par with most of the other Asian countries. Along with Japan these Asian tigers had a very successful growth rate over 7 - 8 % annually till the 1980’s because they managed to incorporate new technology and use it innovatively in their economies (Perkins, 2001). Therefore the lack of technology acts as a hindrance to economic development.

c) Instability

Political and social instability is another main reason that hinders developing economies. Unrest in countries will lower the efficiency of the workforce. It will increase the military spending in the country and it will destroy domestic infrastructure and drive away foreign investment. Therefore political instability has an adverse effect on development efforts and hinders development. Curiously there have been studies that have shown that much of political instability arises from the fact that there are economically deprived demographic groups in society. They might be social groups or religious groups but the facts that the elite ruling class or the business class tends to exploit the workers seems universal in many economic systems. The political unrest in many cases can be related to the lack of economic opportunity in one social class. Consequently even if there are ethnically polarized societies if everyone is well off then the possibilities of instability are very low. Therefore if there was a method of giving more opportunities to the lower classes, who are usually the economically undeveloped class, this should eliminate political instability leading to underdevelopment. Elbadawi and Sambanis obtained a similar result in a more extensive study of 161 countries. They found that,

"the relatively high incidence of civil war in Africa is due not to extreme ethno-linguistic fragmentation, but rather to high levels of poverty, heavy dependence on resource-based primary exports and, especially, to failed political institutions" (2000). Therefore if the poverty levels could be alleviated and if there more economic opportunity for the poor classes in the community this will lead to this would lead to stability and to economic development.

7) How to Bridge the Digital Divide

Bridging the digital divide can eliminate all the above reasons hindering economic development. To bridge the divide, three needs are most paramount: a coherent strategy toward

ICT, the existence of an affordable telecom infrastructure, and the availability of an educated workforce (Pastore 2001).

I would like to focus on two methods of bridging the digital divide, namely, infrastructure development and IT education. Though both of these can be used to bridge the divide it is not clear who should be responsible for implementing these methods and for forming the coherent strategy towards ICT.

a) Infrastructure Development

Since ICT and the Internet are extremely technology depended, it is paramount that the necessary infrastructure be available. The infrastructure development is vital if people are to have access to the Internet and ICT's. Kofi Annan's words, "All nations must have the requisite infrastructure, most notably telephone lines"(Annan, 2002), highlight the need for infrastructure development if the divide is to be bridged. In a world where there are still villages without electricity this might seem to be a very difficult task.

Though infrastructure development was a hindrance for rural villages to get online, with the advent of cheap wireless technology it is possible to get online without laying pone lines etc. Many developing regions without phone lines are relying on wired phones and wireless Internet access to get online. The infrastructure development doesn't have to follow traditional methods with phone lines and electricity, as the example with the Kothmale Radio Internet project will illustrate.[2] But there has to be some manner of physical infrastructure development to bridge the digital divide.

b) IT Education

Though infrastructure development will allow for access of ICT's people will not use the new technology unless they are educated or taught. It is evident there is a phobia for the Internet and ICT's among many people who are not aware of the potential benefits and how to use the technology. Since most ICT's are skill based technologies there has to be a proper training and education to teach people the benefits of using ICT's if they are to use it to improve their lives.

One ray of hope is that children are very adept at learning the technology. A recent study done by NIIT in India showed how children from fishing villages and slums are able to learn to surf the net without any knowledge of computers or English and without any formal instructions. The results were very impressive, "By giving them computer access, NIIT observed their rapid learning abilities and keen interest in gaining knowledge."(India 2001). The study further found that the children learned to listen and download music, and draw pictures without any reward (BBC 2001). This example illustrates that it might be possible to use the Internet to teach people about the Internet. Meaning that ICT can be used as a medium to educate people about ICT, Access could lead to usage.

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[2]Section 8 contains details of the Kothmale Project.

c) Who should be responsible

Thought it's clear that there has to be ICT education and infrastructure development it is very unclear who has to be responsible for these changes. It is sometimes argued that

Governments should take the responsibility while there are also valid reasons as to why business and consumers should be responsible. This paper will not discuss who is going to be responsible but it should be stated and remembered that it is not clear who is responsible for all the changes that are necessary. Section 8 present examples of programs that have already been conducted to reduce the digital divide and attain economic development. What is clear from many of these is that the responsibility seems to be shared among national governments, private firms, and international organization and NGO's. This lack of a clear responsible sector is one reason that might hinder the spread of ICT's and Internet and make the bridging of the divide difficult.

8) The Impact of Bridging the Digital Divide

A report by the International Labor Organization found that ICT and the Internet can have a far-reaching impact on the quality of life of workers in poorer countries if the right policies and institutions are in place and serve as important spurs to development and job growth. The report further stated that ICT and the Internet "may allow lower income countries to "leapfrog" stages in traditional economic development via investments in human resources" (Pastore 2001). I would like to focus on three benefits of bridging the divide: productivity increases, increase in availability of information, and increase diffusion of technology.

Productivity increases

It is possible to increase productivity in undeveloped countries and regions by bridging the divide in ICT and Internet access and usage. This is mainly a result of the time saving and labor saving methods introduced by ICT. The Indian government recently launched a pilot program in Andhra Pradesh in India where rural women were taught how to do their banking online. The rural women responded positively to this, "By doing so, we [the rural women] are saving time, travel cost and loss of wages..."(NDTV, 2002). This example illustrates how the women are saving a substantial amount of time by conducting their financial transactions over the Internet, leading to an increase in productivity. Since the Internet makes perfect competition more realistic even a small farmer will be able to sell their produce directly online. Eliminating middlemen will increase the revenue earned by the farmers and will lead to increases in productivity. Similarly when purchasing fertilizer or seeds or raw materials the Internet will offer a wider choice where the producers will be able to choose better raw material leading to higher levels of productivity.

a) Increase in availability of information

In a world where information is power the ICT will bring this power to the rural villages and undeveloped regions. The Internet gives a "chance to link up, talk and share notes" (Noronha 2002). An example of the value of sharing information is India's ISAP (Indian Society of Agricultural Professionals), an initiative to bring together agricultural professionals from across India. ISAP uses e-mail and mailing lists to pass valuable information about demand and supply of products. Farmers can use ISAP to see where the demand for their product lies and buyers can use this network to look for their ideal product (Noronha 2002). This is just one example on

how the Internet and ICT can be used to cut cost and make transactions efficient by ensuring the availability of information.

b) Diffusion of technology

As new technology and methods are discovered else where in the world, ICT makes it possible for these to be available in rural underdeveloped areas. The resulting new technologies can lead to increase levels of development in these regions. If more efficient methods of production or storage are found this would lead to a decrease in costs making leading to higher profits. The increased income will in turn lead to better living standards.

9) How Bridging the Divide Will Lead to Economic Development.

Focusing on the above changes or opportunities created by bridging the digital divide it is possible to see how undeveloped areas can be developed more effectively. Increases in productivity will lead to overall increases in the levels of income and will lead to better quality of life. Similarly increases in the availability of information will make it possible for both producers and consumers to be more efficient. If a farmer was unable to sell all of his produce because he was unable to find a buyer in the same region the internet would mean that he is able to search wider especially with initiatives like ISAP. This would mean that the increase in efficiency would lead to development.

The diffusion of technology created by bridging the divide will lead to a higher level of technology for underdeveloped areas. Similarly the profusion of information that is available and methods of online schooling will make education more affordable and reachable is rural areas. Also the productivity increases along with higher education and will increase the standard of living of people and lead to a uniform distribution of wealth. This means that political stability will also be achieved. Therefore bridging the digital divide will address factors

hindering development, lack of education, lack of technology and political instability. Therefore it is possible to attain development by bridging the digital divide.

10) Programs Already Implemented to Bridge the Divide.

There have been many successful programs already initiated throughout the world to bridge the digital divide. Most of these programs have increased the well being of the people involved leading to higher rates of economic development among the undeveloped regions and countries.

In Sri Lanka, The Kothmale Community Radio Internet Project, implemented by UNESCO, was a pilot experiment that addressed most of the barriers hindering access to the Internet. "The Kothmale project uses community radio as an interface between the community and the Internet through a pioneering 'Radio-browse' model, thereby introducing an indirect mass access to cyberspace through a daily one-hour interactive radio program"(Jayaweera 2001). They also run a cyber access café at the site to give access to people who are able to come to the station.

The benefits of the program can be illustrated by a few examples of the results achieved by the program.[3]

1) The village baker found various recipes to improve the quality of his products.
2) A farmer found information on improved techniques of tomato growing and storage.
3) A group of local producers found export possibilities for "Jaggery," a local palm product.
4) An English teacher of the local school often visited with his class and downloaded lessons and games for learning English.
5) A listener visited to find information on bamboo craft and organized an exhibition of improved bamboo products, which he produced with the new knowledge acquired from the Internet sources. [3]

(Jayaweera, 2001).

The pilot program in Andhra Pradesh that was mentioned earlier, where rural women were taught how to do their banking online is another example of a successful project (NDTV 2002). Similarly through programs such as US Aid's Internet for Economic Development Initiative, the United States is supporting developing countries. The Initiative is a collaboration with the private sector, multilateral organizations and non-profit organizations and enhances access to the information revolution, and helps developing countries use electronic commerce and the Internet as tools of economic development (White 2000). These examples chosen from among many similar illustrate how the bringing can lead to economic development. The benefits of bridging the divide that we discussed in Section 6 are illustrated in these examples.

11) Conclusion

Economic development reflects the overall increase in living standards, increase in education levels and increase in per capita GDP. The digital divide is the gap between those that have access and use ICT's and the Internet and those who do not. There is a pronounced divide between those who have access to the Internet and ICT's nationally and globally. Interestingly the digital divide also seems to be broken along the lines of development and underdevelopment. That is the underdeveloped region and countries do not have access to ICT's and Internet. The underdevelopment in these regions are mainly due lack of proper education, technology and political instability. The digital divide can be bridged by infrastructure development, and proper IT education. Bridging the divide would result in an increase in

[3] The complete list of the results of the program is included in Appendix A.

technology diffusion, increase in education, and increase in productivity and income. Thus eliminating the divide will eliminate some of the reasons hindering economic development and also create new avenues for growth. Therefore it is possible to achieve development by bridging the digital divide. Practically there has to be significant infrastructure development and forward looking government policies aimed at bridging the digital divide if development is to be achieved. Also it is very unclear who should be responsible for bridging the divide. What is clear is that if the divide is not bridged it will result in an increasing disparity of living standards globally leading sever human consequences.

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Appendix A

The following few examples describe the utility of Internet access at Kothmale community radio.

1. The village baker found various recipes from the Internet to improve the quality of his products.
2. The funeral undertaker learned more about embalming techniques from Internet sources.
3. The village blacksmith browsed web sites to know more about modern implements for his trade.
4. An elderly woman visited a website of Buddhist sacred places of India, and was very pleased as it was beyond her financial resources to visit the sacred places in person.
5. A farmer accessed the Internet to find information on improved techniques of tomato growing and storage.
6. A group of local producers used the Internet and found export possibilities for "Jaggery," a local product of palm treacle.
7. An English teacher of the local school often visited with his class and downloaded lessons and games for learning English.
8. Many community members opened e-mail accounts at the radio station and used the facility to exchange e-mail with their relatives working abroad.
9. A listener visited to find information on bamboo craft and organized an exhibition of improved bamboo products, which he produced with the new knowledge acquired from the Internet sources.
10. A group of young people used Internet sources and networked with an organization abroad to form an environmental NGO. They then mobilized resources to launch a reforestation program in their community.
11. Radio provided location-specific weather reports (for the coming four days) by reading real-time satellite pictures and whether forecast data from Internet sites.

These are not mere anecdotes, but rather a few examples of what was happening on daily basis.
(Jayaweera 2001).