

The Blind Men and the Elephant

The Third approached the animal,
And happening to take
The squirming trunk within his hands,
Thus boldly up he spake:
“I see,” quoth he, “the Elephant
Is very like a snake!”

John Godfrey Saxe's (1816-1887)
version of the famous Indian legend.

CHAPTER FOUR

**AN ANALYTICAL FRAMEWORK FOR THE STUDY OF THE GLOBAL
DIGITAL DIVIDE AND THE RELATION WITH HUMAN DEVELOPMENT**

The global digital divide and international development

As mentioned in Chapter One, even though the term “digital divide” was coined during policy discussions held for the U.S. Telecommunications Act of 1996, since then, the term has broadened to include differences in access to all digital information and telecommunications technologies, including the internet. For the purposes of this study the global digital divide was defined as the gap established due to unequal capacity among countries to *access*, *adapt* and *create* knowledge via the use of digital information and communication technologies. From the perspective of international development, the importance of studying the global digital divide lies in the effects it may have created (and maybe is still creating), on national development, especially in the developing world. However, the use of digital information and communication technologies in a country is embedded in the economic, social, and political context of development.

Differences in development are usually explained by a myriad of economic and socio-political factors according to different practical experiences and theoretical perspectives.

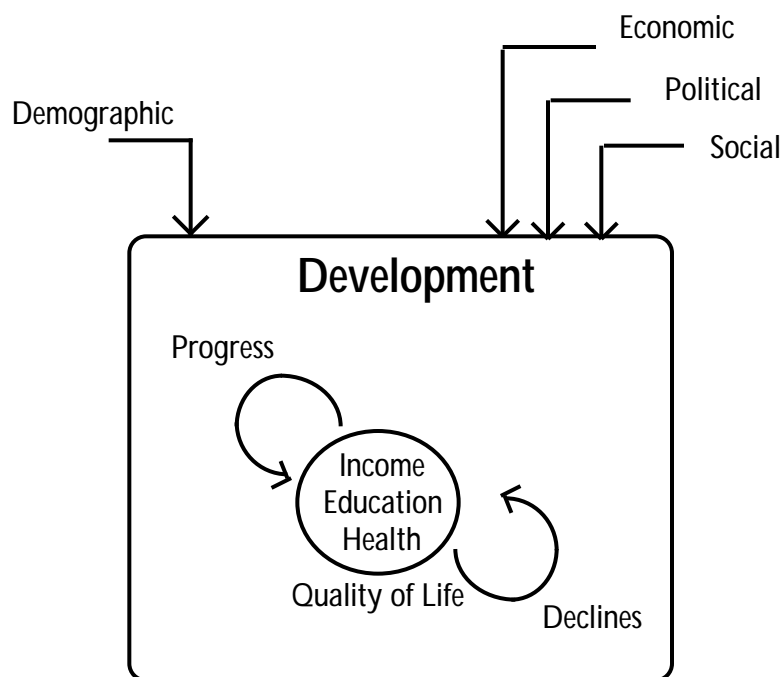


Figure 4.1. Progress and declines in development

Access of individuals to new technologies has always been linked to education and above all, income¹. One could argue that the global digital divide is merely a reflection of the divides in incomes. Income differences would suffice to explain global patterns of the digital divide, which would mainly reflect global patterns of economic development. The economic wealth of a country would be enough to explain the global digital divide. Not surprisingly, studies that have analyzed the phenomenon in OECD

¹This is confirmed by many models including E.V. Rogers' social model of diffusion of innovations in which income and education are taken as the most important predictors of the adoption of innovations by individuals within a social group. For more detail see Appendix A.

countries have found that the number of Internet hosts per country is significantly related to levels of economic development (OECD 2000a). However, focusing on this single factor as determinant of the global digital divide is bound to leave out many of the lessons learned from practical experiences, as well as other factors suggested by economic growth models, development economics and other social theories of development² over the last decades.

From a practical point of view, let us consider the differences in development explained by comparing national demographic patterns such as those produced by population growth and the percentage of the population engaged in productive activities³. Countries with high levels of population growth and low levels of productive populations like for example Rwanda (with 3.2% population growth and only 50% of the population engaged in economic activities) is bound to have a strong negative demographic feedback loop that will hinder development at the most basic level. Whereas the population growth for the industrialized countries is on average 0.3%, for all developing countries it is on average 1.4%, and for less developed countries it is on average 2.2%. With such strong negative demographic feedback loops, it is very unlikely that digital information technologies will make a difference beyond the elite within a country. Basic demographic indicators would be helpful in explaining why although home to half a billion people, the thirty five less developed countries like Nigeria, Bangladesh and Uganda contain only

² For a more detailed presentation of economic and social theories of development see Appendix E .

³ The analysis of demographic transitions as determinants of development trace back to the early 1950s and go well into the 1970s. For an introduction on demographic transitions and development process see Nerlove, M. 1974. "Household and Economy: Toward a New Theory of Population and Economic Growth." *Journal of Political Economy* 82:S200-S218.

5% of online population, whereas eighty three countries (mostly in SubSaharan Africa) have only between 0 and 0.3% of the world's online population.

Other demographic variables such as life expectancy are also critical to development. For example from 1990 to 1997, instead of making progress, sixteen countries decreased their levels of human development. The Human Development Report (UN 2000) suggests that mostly in SubSaharan Africa, these decreases are due to the HIV/AIDS pandemic's effect captured by declines in life expectancy in countries such as Zambia, Zimbabwe, Uganda, and Botswana.

From a practical point of view, the impact of information technologies on *less* developed countries is closely tied to basic demographic considerations. Considering how fast a population is growing, what percentage of the productive population is engaged in economic activities, and what levels of life expectancy are present provide valuable insights to whether positive demographic feedback loops may allow a country to progress in development. However, the use of digital information and communication technologies also requires basic literacy:

According to the notion of a literacy divide promoted by scholars such as Goody (1968; 1973; 1988) and Havelock (1963; 1986) individuals and societies could be divided up into whether they were literate or not, with far-ranging cognitive and social consequences automatically determined by this distinction. Over the last 20 years though, in-depth research, including that by Scribner and Cole (1981) with the Vai people in Liberia, who were literate in their own language but had never gone to school, revealed that literacy in and of itself brought virtually no cognitive or social benefits, and that almost all the benefits associated with literacy came instead with the other social activities which surrounded it, such as schooling. Critical theorists of literacy now agree on the following points:

- There is not just one, but many types of literacy (e.g., Cope & Kalantzis, 2000; Gee, Hull, & Lankshear, 1996)

- The meaning and value of literacy varies in particular social contexts (de Castell & Luke, 1986; Street, 1984)
- Literacies exists on a continuum, rather than a bipolar opposition (Gee et al., 1996)
- Literacy alone brings no automatic benefit (Scribner & Cole, 1981)
- Acquisition of literacy is a matter not only of education and culture, but also of power (Street, 1984)

These points can also serve as the basis for a theory of the digital divide and online access: There is not one type of online access, but many; the meaning and value of access varies in particular social context; access exists on a continuum, rather than in a bipolar opposition; access alone brings no automatic benefit; and acquisition of access is a matter not only of education and culture, but also of power. (Warschauer unpublished manuscript, p. 9)

Considering income, demographic and education differences among countries would take us a long way in explaining patterns of use of digital information and communication technologies. However, when examining some countries like Singapore that have achieved high levels of economic growth, high literacy rates, high levels of Internet access, it is surprising to find that Singapore produces relatively little Internet content for either the domestic or international market. Singapore falls “in a category of limited online producers with countries such as Bolivia, Vietnam, and Sri Lanka (Zook, in press). Singaporeans thus benefit from accessing the Internet, but the lack of political and educational (Warschauer, 1999b) freedom there apparently discourages content development” (Warschauer unpublished manuscript, p. 9). Furthermore, two empirical studies carried out in cross-national analysis of developed and developing countries both suggest that one of the most important factors impacting the level of Internet access is political openness (Crenshaw and Robison 2000; Wilson and Rodriguez 2000).

Even though there had been some inconsistency in economic studies regarding the positive relation between democracy and increases in economic growth, (Helliwel 1990; Helliwel 1992; Lipset 1959) when political *and* economic freedom are considered at the same time the anomalies registered before are much better explained becoming robust indicators of development (Bollen 1990; Helliwel 1990; Helliwel 1992; Lipset 1959; Pourgermani 1988; Sirowy and Inkeles 1990). However, this was not confirmed by Robison and Crenshaw's study of the relation between economic freedom and political freedom in explaining the internet growth. Robison and Crenshaw's study found that political openness was a much more important factor than economic openness, which did not positively correlate with Internet access (Crenshaw and Robison 2000). The discussion on how political freedom affects the digital divide (and vice versa) is only beginning and will continue as other studies explore the relation between economic freedom, political freedom and the global digital divide.

Finally, even though a country's infrastructure has always been critical for development, it seems like during the last decade, the underlying "wired" infrastructure such as the telecommunication capacity and power generation became increasingly important for the use of information and communications technologies. The simple fact that the deployment of telecommunications systems requires a reliable energy supply appears as an important problem in several studies. See (Gurova et al. 2001) for a review. Furthermore, in the early 1960s, telephonic infrastructure was proven to be highly associated with economic growth indicators (Jipp 1963). Since then, the relation between teledensity⁴ and economic growth has been refined with sophisticated analysis of association, supported by detailed case studies (Cronin 1991; Hudson and et. al. 1982;

⁴ Teledensity is the number of main phone lines per 10,000 habitants.

Roller and Waverman 1994). Teledensity and electricity are viewed as an input to the productive process, a “factor of production.” However, the causal relation has been more elusive to prove: is high teledensity the result or the consequence of economic growth? There is evidence that suggests that poor telecommunication infrastructure is an impediment to growth in specific cases (Kim, Kim and Yoon 1992; Madden and Savage 1998) and that strong causality exists in both directions (Kim 1992; Roller and Waverman 1994). In any case, regardless of the academic debate, teledensity and power supply are widely accepted as drivers of economic growth in developing countries (Saunders, Warford and Wellenius 1994).

In sum, from a practical point of view we must consider economic, demographic, education, health, political and infrastructure differences among countries to explain differences in development as illustrated in Figure 4.2.

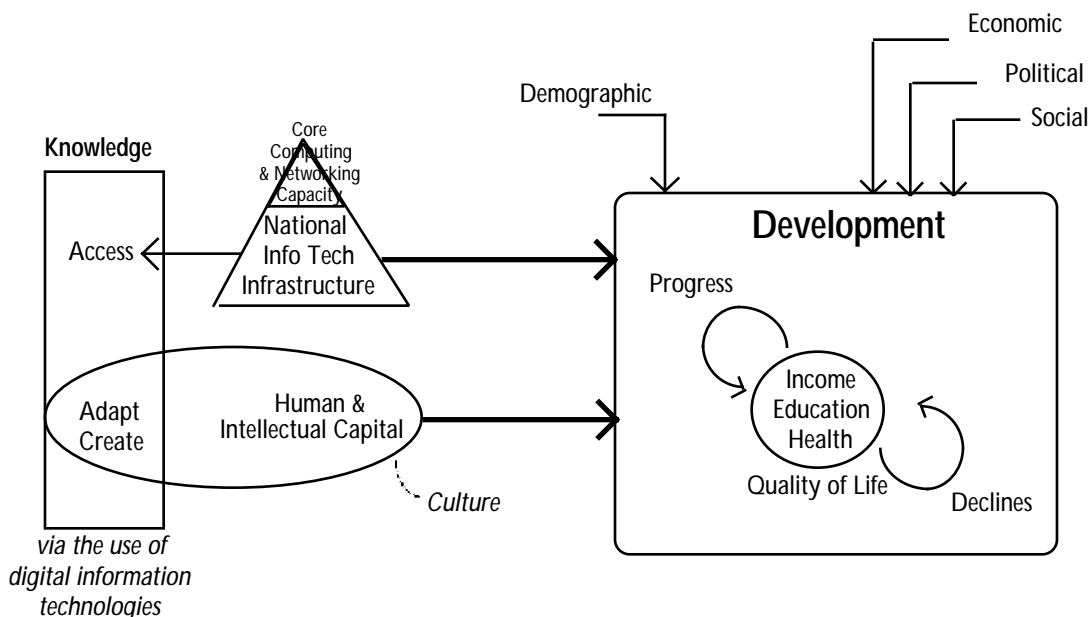


Figure 4.2. A framework for exploring the relations between national info tech infrastructure, human and intellectual capital and human development

After five decades of testing development interventions designed from different theoretical perspectives there is still no single and definitive development theory. Interesting enough, even though the same development formulas are carried out throughout the globe, the results are far from homogenous (Gereffi and Fonda 1992). Neo-liberal models of economic development and growth do not explain the actual experience of some countries that have followed the dictates of the neo-liberal model and are still waiting for growth to improve, whereas others that have applied the model in a different policy sequence or have ignored the policies have experienced high rates of sustained growth (World Bank 1997). The gap between prevailing models and actual experience is more evident in regions like East Asia, or countries like China. In China, for example, privatization was deferred and competition encouraged, producing a growth in GDP in such a way that if the country's provinces were separate countries they would rank as the twenty fastest growing economies in the past two decades (World Bank 1998). This has also been true for the telecommunications sector in China in which a policy of restrained liberalization has encouraged telecommunication operators to investment without implementing full privatization and liberalization strategies. This policy was successful *because* it was sympathetic to the cultural norms in China and did not send shock waves by attempting a radical transformation (Yan 1998).

Theoretical perspectives on the global digital divide and development

Many of the original theories of development were first and foremost economic theories. Even though early macro-level economic analysis was traditionally concerned with the formulation of economic growth models (Domar 1946; Harrod 1939; Lucas

1988; Romer 1983; Solow 1956; Swan 1956), new growth theory placed more importance on endogenous factors such as knowledge and human capital for economic growth (Grossman and Helpman 1994; Romer 1990). This was later confirmed by micro-level economic analysis (Chenery and Srinivasan 1988) on economic transformation, suggesting that structural transformation and institutional change played an important role in the transformation process (Hayami and Ruttan 1970; Olson 1996). The levels of corruption, non-tariff barriers to trade, the fiscal burden of government, the rule of law, the regulatory burdens, restriction on banks, labor market regulations, and black market activities were some of the factors that had to be taken into account when explaining why economic growth had not occurred as expected (Grossman and Helpman 1994; Romer 1990). Development requires economic growth, yet the role played by institutions and human capital are helpful in explaining differences that economic determinism cannot predict.

Indeed, even though basic literacy levels are required to *access* digital information and communication technologies, *adaptation* of knowledge and local *creation* of knowledge depends more on human capital factors such as the strength of the scientific institutions than on infrastructure. Recently, there have been a number of models⁵ that associate science and technology to economic growth (Schofer, Ramírez and Meyer 2000; Shenhav and Kamens 1991). A country's intellectual capital capacity is affected by the number of scientists and engineers working in research and development, i.e. the number of people trained to work in any field of science who are engaged in professional or technical research activity, jobs that require completion of tertiary education (Morita-

⁵ Work on science and technology indicators has so far been limited by the absence of comparative longitudinal data.

Lou 1984). Therefore, adaptation of knowledge and co-invention⁶ carried out by highly qualified individuals will in turn, result in increases in national intellectual capital.

What other factors would be important to explain development differences between countries with comparable demographic, economic and political characteristics? Whether from an individual or societal perspective, in some of the more recent contributions to development theories⁷, considerably more attention is being paid to cultural aspects, their complexity and diversity, and to the ways in which culture-specific conditions affect development strategies (Fairbanks 2000; Inglehart 2000a; Inglehart 2000b; Inglehart 2000c; La Porta et al. 1997; Lindsay 2000; Livernash and et. al. 1993; Perry 1992; Roberts and Hite 2000). In this context, we understand culture as the values, attitudes and beliefs, orientations and underlying assumptions prevalent among people in a society. Since the 1960s, modernization social theory of development⁸ offered

⁶ Infrastructure in digital information and communication technologies is also important for the process of co-invention. Co-invention activity is produced by adapting technologies to unique situations. Bresnahan, Timothy F., and Shane Greenstein. 2001. "The economic contribution of information technology: Towards comparative and user studies." *Evolutionary Economics* 11:95-118. Co-invention costs at national level are associated with the adaptation of solutions in other countries to unique circumstances. The ease with which co-inventions arise within a country is a function of its infrastructure, and the growth of the infrastructure as local demand grows Bresnahan, Timothy F., and Shane Greenstein. 2001. "The economic contribution of information technology: Towards comparative and user studies." *Evolutionary Economics* 11:95-118. See Appendix F for more detailed discussion on co-invention, technology transfer and intellectual property rights.

⁷ For a more detailed discussion on modernization theory and the role of culture in economic growth see Appendix G.

⁸ In the early 1960s, a social development theory known as Modernization theory predicted a decline of traditional cultural values and their replacement with modern values when economic development occurred. From a modernization perspective, changes in traditional societies towards more "rational" attitudes will produce changes in development, yet other aspects such as dependency are proposed by World Systems theory as the basis of development differences. For a more detailed presentation of

theoretical explanations that included culture as basis for explaining the differences in development (Bertrand 1972; Deutsch 1961; Frank 1969; Hibbs 1973; Inkeles 1969; Inkeles and Smith 1974; Kahl 1968; Levy 1966; Olson 1963; Parsons 1964; Rogers and Svenning 1969; Rustow 1967).

The context in which development occurs is important to consider when analyzing national differences. From a political perspective, explanations lie in the quality of the democratic system, the breadth and depth of civil society, the rule of law, and the strength of institutions, among others. From an economic perspective, explanations consider the importance of non-tariff barriers to trade, the fiscal burden of government, the rule of law, the regulatory burdens, restriction on banks, labor market regulations, and black market activities. From a socio-cultural perspective, exacerbated ethnic and regional differences are explained by cultural explanations⁹, but so are the failures of applying the same economic formulas everywhere. Trade liberalization will not result in lower prices if rents are expropriated by monopolist distributors, and privatization will not improve welfare if government monopolies are replaced by private ones. Institutions will not change if the incentive structure for individuals within the institutions is not adjusted. Policy that does not recognize institutional arrangements and constraints is likely to be ineffective and may even have adverse effects.

Economic, political and social descriptions of national development processes within a country are only partial descriptions (at best) of complex systems. All the factors seem to be related, creating virtuous or vicious cycles, positive or negative feedback

differences among Modernization and World Systems theories please see Appendixes E and G.

⁹ *ibid.*

loops. It would be naïve to consider that absolute development differences can be explained by differences in access, adaptation and creation of knowledge using digital information and communication technologies. However, exploring the relation between relative differences in infrastructure, human and intellectual capital and levels of development may provide some insights for explaining differences in progress in development over the last decade in which digital information and communication technologies played an increasingly important role.

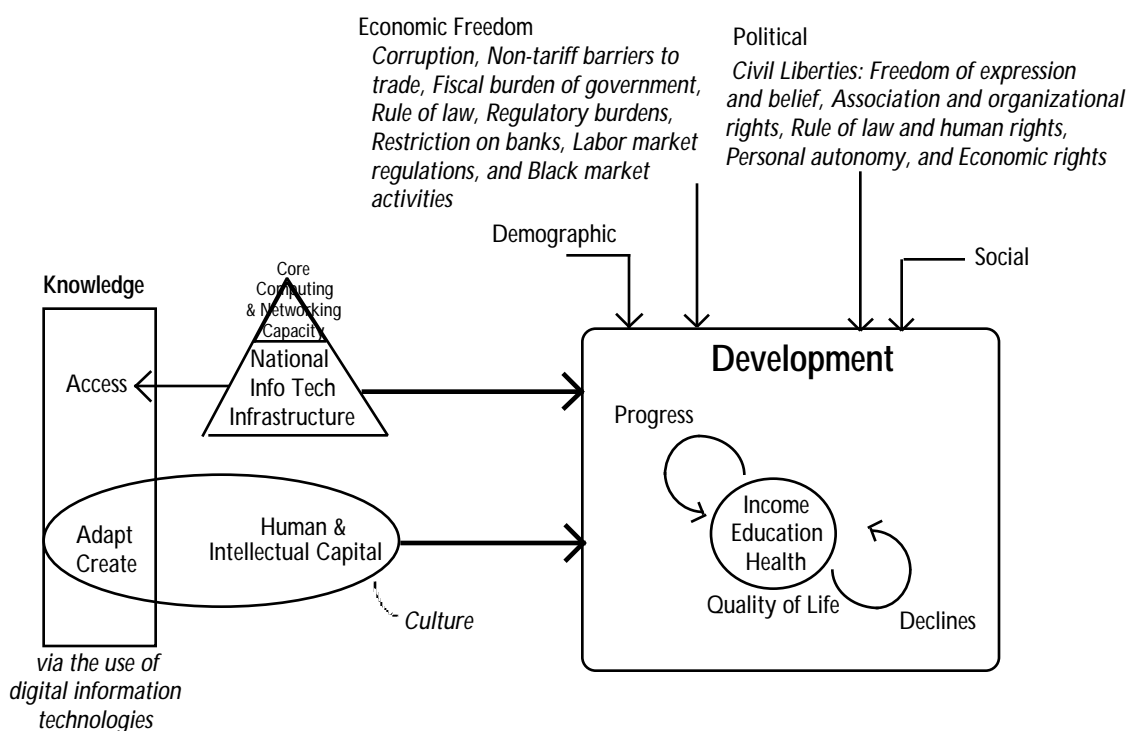


Figure 4.3. A more detailed analytical framework for the exploration of the relation between the global digital divide and human development

Figure 4.3. illustrates the analytical framework used in this study to explore the relations among several factors and feedback loops created by the global digital divide in national development processes. A positive feedback loop would be produced by a strong

info tech infrastructure improving *access* to information (and knowledge) via digital information technologies; which in turn, would produce the conditions for another positive feedback loop in which higher levels of human and intellectual capital would improve *adaptation* of information (and knowledge) to local needs thus resulting in more *creation* of information (and knowledge). A negative feedback loop would be produced by an inadequate info tech infrastructure inhibiting *access* to information (and knowledge) via digital information and communication technologies, which in turn would inhibit increases in human and intellectual capital necessary to *adapt* information (and knowledge) to local needs.

The analytical exploration of these loops is carried out by exploring the answers to the following research questions: What is the importance of a national computing and networking capacity versus the “wired” infrastructure capacity for explaining national development over the last decade? Has national computing and networking capacity affected progress in development? What is the nature, direction and strength of these relations? What is the role played by human and intellectual capital in the process? Is there any type of relation between the global digital divide and cultural values?

As stated before, answers to the research questions proposed in this study are only the beginning of an exploration of the impact of the global digital divide on national development processes. An empirical exploration of all the aspects and effects of the global digital divide on development would carry us well beyond the scope of this study. They are by no means an exhaustive list of questions, but they address questions relative to the core of the relation between digital information and communication technologies and international development.