The fragility of knowledge societies : ambiguity, cost reduction and access in developing countries

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The Fragility of Knowledge Societies: Ambiguity, Cost Reduction and Access in Developing Countries

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The *Missing Link* Report's authors sought to achieve an important goal – "All mankind could be brought within easy reach of the telephone by the early part of next century" (Maitland 1984: 69). The main challenge was to improve the reach of the telecommunication infrastructure and to do so by emphasising not only technology, but the strategies, market and regulatory mechanisms, technical and management capabilities, training and financing that would be required to achieve this goal. Twenty years on, much has been achieved in terms of new opportunities to enable the poor, and especially those in rural areas, to be connected to the telecommunication infrastructure and the services on offer today. Whereas in the mid-1980s three-quarters of the world's telephones were concentrated in nine industrialised countries, by the mid-2000s the World Bank (2005: 10) was claiming that more than half the world's households have access to a fixed line telephone and that the footprints of mobile operators are accessible to 77% of the world's population. However, the gaps in access to this infrastructure remain 'considerable' in rural areas.

The deployment of fixed and mobile networks, together with the arrival of the Internet protocol, means that the potential for achieving some form of connectivity is improving. These figures unfortunately do not tell us anything about the quality or cost of the services provided, much less their affordability. The problems of achieving access and benefiting from the potential benefits of such access have not diminished. In this chapter I emphasise issues that arise when connectivity is a realistic prospect. Apart from the huge investment required to put the necessary infrastructure in place[1], the challenges of addressing additional issues associated with ensuring that connectivity brings advantage, rather than new forms of disadvantage, are also considerable.

One way of interpreting the *Missing Link* Report is to suggest that its authors believed that it was imperative to get people connected to networks in whatever way, whether by using older or newer telecommunication technologies. I argue that achieving connectivity is very important, but that

since the Report's publication we have learned a great deal about the ways in which these technologies are related to development aspirations and poverty reduction. Although the 'promise' of new technology is substantial, it is clear that, once connected, ambiguous consequences often follow. If the visions of knowledge societies that are in play today are to have any chance of being fulfilled, then these consequences need to be examined from a variety of vantage points. This is essential to ensuring choices are made that give people a chance of using telecommunication connectivity to escape from poverty or to make other improvements in their lives.

All forms of connection to electronic networks bring new ambiguities into people's lives whether they are citizens or the employees of firms in various information and communication technology (ICT)-using sectors of the economy. On the basis of empirical evidence, there is not necessarily a relationship between achieving connectivity – even affordable connectivity – and enabling people to make improvements in their lives, *as they choose*. Therefore, it cannot be argued that achieving access to global networks should be the imperative in every instance. Local circumstances must be taken into account. Whether by virtue of their presence or their absence – or indeed the specific nature of their presence – ICTs have a 'politics' and these politics affect everyone. It is necessary to consider the entitlements and responsibilities of individuals and firms because decisions about whether to invest in new networks and content involve assessments of whether to allocate scarce resources when there are many other priorities requiring a response in the development context.

In this chapter, I use two illustrations to reinforce this observation. The first comes from the supply side in the form of industry efforts to reduce the costs of accessing the Internet for the poor. One of the recommendations of the *Missing Link* Report (8j) was to encourage manufacturers and operators to develop systems that would enable people living in remote areas of developing countries to access networks at lower cost. I assess some of the ambiguities associated with recent initiatives aimed at achieving this. The second comes from the demand side through an examination of the way e-commerce applications are perceived by potential users in developing countries and the ambiguous outcomes for firms that have achieved connectivity. In both instances, we encounter evidence of the fragility of knowledge societies, which arises from a failure to foster developments in technologies, and services that are fully responsive to the needs of their intended users.

Technologies of Power

In the *Missing Link* Report it was observed that "...from the beginning we all recognised the *political character* of our task ... neither in the name of common humanity nor on grounds of common interest is such a disparity

acceptable" (emphasis added) (Maitland 1985: 3). It is crucial that we think of ICTs as 'technologies of power' in the broadest sense. This does not mean that events are determined by technology; nor does it mean that these technologies are entirely malleable in the hands of individual political and other actors. Thomas Hughes, an economic historian, studied the history of many different kinds of large technical systems. His work tells us that "we have understood for centuries that technology is an instrument of power" (Allen and Hecht 2001: 1). Whether one is a producer or designer of ICT systems – or one is seeking to use technology to communicate or to exchange information, these artefacts and their contents are 'instruments of power'. Whether and how they are deployed is a reflection of a highly political process, as the authors of the *Missing Link* Report acknowledged. In the light of Michel Foucault's analysis of institutions, we know that power relations are embedded in technologies and in the social relations around them (Martin et al. 1988: 1). The outcomes are not predetermined, but they are often ambiguous depending upon whose point of view is taken into consideration. These perspectives make it clear that it cannot be assumed that connectivity is always advantageous. There may be negative consequences, including new forms of exclusion from emerging knowledge societies (Castells 2001).

At about the same time that the *Missing Link* Report was issued, another analyst of technological change was asking whether 'artefacts have politics'. Langdon Winner's (1980) answer was that they do. Just as the telecommunication infrastructure can be said to have a 'politics', so the immaterial flows of data and information and complex patterns of communication that are pervasive today can be seen in this way. As Winner (1986: 20) put it, "what matters is not technology itself, but the social or economic system in which it is embedded". The challenge is to understand the politics of today's ICTs. The stakes are high because of the opportunity presented by the second phase of the World Summit on the Information Society (WSIS). It is important to answer Winner's question because of the necessity to become more aware, not only of the economics of change, but also of the politics of change.

In the run up to the WSIS in November 2005, the International Telecommunication Union (ITU) launched a new initiative to 'bridge the digital divide'. *Connect the World* is an initiative in which partnerships are seen as central to connecting communities (ITU 2004). It is estimated that about 800,000 villages – or 30% of all villages worldwide – are still without any kind of connection. ITU Secretary-General, Mr Yoshio Utsumi, said at the launch, "ICTs now underpin just about every aspect of modern life. They are basic infrastructure, as necessary to economic and social development as postal services, banks, medical centres and schools" (ITU 2004: 1). *Connect the World* emphasises the importance of partnerships

between the public and private sectors, UN agencies and civil society. Alcatel, Huawei, Intel, Microsoft, KDDI, Telefónica, Infosys and WorldSpace, and others have joined. This initiative is "about harnessing the power of people working together to connect the unconnected" (ITU 2004: 1).

How do we ensure that lessons about the political character of technology are considered in this case? Our track record of doing so is not very good. For instance, in 1980 UNESCO published its *Many Voices, One World* Report. Its authors emphasised content and communication rather than telecommunication, but they argued that, "... the basic decisions in order to forge a better future for men and women in communities everywhere ... do *not* lie principally in the field of technological development: they lie essentially in the answers each society gives to the conceptual *and political foundations of development*" (emphasis added) (MacBride et al. 1980/2004: 12-13). Many studies have been undertaken to measure the impacts of investment in ICTs on economic and social development, especially in developing countries. Such studies embrace both older and newer technologies from the radio to telecommunication networks, personal computers, community telecentres, entrepreneurs' kiosks and prepaid mobile phones (Kenny 2001; Spence 2003, UNDP 2005). Unfortunately, few of these studies are designed to throw light on the politics of technology or on the ambiguities that connectivity can create. Such studies rarely examine the political, social or cultural contexts of the production and consumption of technology or services. They cannot, therefore, shed light on the ambiguities that may arise – that is the possibility that investment in technologies and services can be empowering and, at the same time, disempowering. If reasoned judgements are to be made about whether to give a high priority to investment to achieve connectivity for the poor, it is this kind of understanding that is required. This means that we must put the analysis of the politics of technology at the centre of our concern.

Technological Choices and Digital Divides

One of the instances where choices are being made about connectivity is with respect to the design of Internet access devices that are intended to enable lower income people to connect with the Internet. The WSIS Action Plan (WSIS 2003) set targets for bringing connectivity to those who remain unconnected to global networks; the Millennium Development Goals also include a reference to ICTs[2]. One possibility is to reduce the costs of hardware and software. During the World Economic Forum in Davos in 2004, AMD (Advanced Micro Devices), the manufacturer of microchips, launched a campaign called 50 x 15 (AMD 2005). The company's goal is to build partnerships and to connect 50% of the world's population to the Internet by 2015.

AMD's 'ecosystem' of companies aims to develop usable, affordable technologies and to make them easily accessible for people in global, high growth markets. AMD has released the PIC – a Personal Internet Communicator – that the company initially expected to sell at about US$ 185 (Torres 2005)[3]. Solectron in Mexico is manufacturing prototypes. Launched in India by Videsh Sanchar Nigam (VSNL), the largest telecommunication company, the PIC is being offered to broadband customers as part of a bundled Internet service. A variety of financing options is available to people on limited incomes (Sadagopan 2004; TATA 2004). In this case, the price is US$ 250 and the PIC is being targeted at households with an annual income of between US$ 1,000 and 6,000. India is expected to provide more than 16 million customers and, with the Chinese, Mexican, Brazilian, and former Soviet Union, the target market rises above 200 million. The PIC allows customers to access an Internet browser, email, word processing and spreadsheet applications, using the Microsoft Windows operating system. The PIC is also being offered by Cable & Wireless as part of a broadband package in the Caribbean (AMD 2004).

In a similar vein, the chairman of the MIT Media Lab, Nicholas Negroponte, wants to launch a US$ 100 portable computer for the developing world. He has reported promises of support from companies such as AMD, Google, Motorola, Samsung and News Corp (Siddle 2005)[4]. However, neither the PIC nor Negroponte's low cost personal computer are the first attempts to market low cost alternatives for very low income people. The development of the Simputer based on Linux by Encore Technologies in Bangalore beginning in 1999 is an attempt to make the Internet accessible to rural Indians, but there have been problems in scaling up this initiative. Launched at a cost of US$ 240 in 2004, it was eventually manufactured by the government-owned Bharat Electronics. Fonseca and Pal (2003: 3) suggest that "bringing the PDA [Personal Data Assistant] interface to low-attainment users without the contextual establishment of their utility then seems like a quantum leap". Similarly, BV Jagadeesh, who founded iNabling Technologies in Bangalore in 2001, has been trying to offer simple, low-cost email access to India's rural population using an 'iStation'. Intel has been considering the idea of low-cost personal computers for some years and Wal-Mart has been selling the Linspire Linux open source operating system bundled with a personal computer for US$ 199 since 2002 (Maguire 2002). Microsoft's CEO Steve Ballmer has also talked of the need for US$ 100 personal computer for developing country markets (Riccuiti 2004). Why have these and other initiatives yet to provide solutions to connect many of the poor? It seems clear that it is not simply a question of cost, nor is it simply a matter of a 'missing link' insofar as, in some cases, the mobile or fixed telecommunication infrastructure is in place.

The question is whether the PIC and similar technological designs are responsive to problems that result in people continuing to be excluded from the potential advantages of connectivity, however it is achieved. To answer this question we have to look both to the economics and politics of these kinds of initiatives.

Discussions about 'digital divides' highlight oppositions which suggest that technological solutions such as the PIC offer a means of alleviating the huge differences that persist (with respect to content, hardware and software) between the poor and the wealthy in terms of their access to ICTs. The last three decades of debate and research on the problems of exclusion from knowledge societies illustrate that a wide range of strategies is needed to address the underlying problems and that, politically, this is very difficult to achieve. Scaling up production of Negroponte's US$ 100 computer will require public investment if it is to succeed even on its own terms. Innovative technologies are often introduced with great optimism in the hope that that they will provide a part of the solution to exclusion; but history shows that optimism needs to be tempered with caution (Howcroft and Fitzgerald 1998; Kling 1996; Mansell and Steinmueller 2000; Mansell and Wehn 1998; Robins and Webster 1999).

Improved access to the Internet using the PIC or a similar slimmed down device is unlikely to address the underlying development problems because the scale of the problems and the reasons for them are substantial and complex. According to the Computer Industry Almanac, the worldwide Internet population of 2004 was 934m and was projected to grow to 1.07bn in 2005[5]. China had the second largest Internet population with 99.8m in 2004 as against 185.5m in the United States, but China had a total population of 1.31bn as compared to the US population of 296m. While China is a rapidly growing economy and may well surpass the US in total output, the figures for smaller poorer countries help to illustrate the observation about the scale of the connectivity problem. Bhutan, with a population of 2.23m, had only 2,500 online users in 2004; the Republic of Congo had 3.04m people with 500 Internet users in the same year. Liberia with a population of 3.48m had 500 Internet users. And compare South Korea, with a population of 48.42m and 31.67m Internet users, with Sudan with a similar sized population of 40.19 million, but only 56,000 Internet users.

In the light of these figures, what is the likely impact of the PIC in alleviating access problems or, indeed, in reducing poverty? One journalist expressed considerable optimism under the by-line 'selling to the poor' – "Blocked in saturated developed markets, start-ups and major companies are targeting lower-income regions, giving them cheaper—and sometimes better—products than those in the West" (Red Herring 2005). However, 'selling to the poor' in the case of the PIC means marketing to those with

incomes of between US$ 1,000 and 6,000 annually; at the lower end, around US$ 2.00 per day. The PIC initiative is designed to promote broadband connectivity and it is being marketed by existing telecommunication operators. For instance, Cable & Wireless in Jamaica is charging US$ 15.00 per month over two years for the PIC but a broadband subscription is also needed, costing US$ 29.95 per month. Thus, the total cost to the user in the first year is US$ 540.00. This is a considerable amount for a potential user if his or her annual income is about US$ 1,000. In addition, there appears to have been little attempt to coordinate this initiative with investment in local digital content or new electronic services, despite the fact that AMD has promoted the PIC, in part, based on its educational value. Finally, although the PIC represents a partnership among a number of corporate players, there is little sign of partnerships with other stakeholders such as representatives of civil society.

In summary, there is little evidence of a reasoned debate involving those who seek to use new technologies in ways that can help to reduce poverty. The corporate players participating in the development and marketing of the PIC are motivated by their forecasts of returns on their investments and they may achieve their targets. But in what sense can it be argued that these initiatives are consistent with optimistic visions of knowledge societies? Even when access is achieved, consideration must also be given to whether services are appropriate and whether they harbour new ambiguities. The absence of a reasoned, inclusive debate about needs and requirements easily gives rise to a mismatch between technological choices and the interests of various users.

Technological Opportunities and Digital Divides

Once connectivity is established, e-commerce applications for businesses are regarded as a major opportunity for firms based in developing countries. Many theoretical analyses of the implications of the development of e-commerce are concerned with how such services affect transaction costs (Wigand 1997; Williamson 1985). By helping to reduce transaction costs, e-commerce and, specifically, e-marketplaces are expected to facilitate trading across national boundaries, especially for firms in developing countries (Malone et al. 1987). Propositions about the impact of e-commerce have appeared in many UN agency reports. These propositions include the notions that e-commerce is likely to work through e-marketplaces; that e-commerce will offer high returns to firms in developing countries (UNCTAD 2001); and that e-commerce will help smaller firms to enter global markets (ITC 2000; UNCTAD 2001).

The expectation underlying these propositions is that the spread of the Internet and the use of the Web will lead to greater market efficiency and

transparency. However, as empirical evidence comes to light in the industrialised countries, it seems that the structure and operation of markets are not automatically modified to achieve greater efficiency and transparency as a result of the application of new technologies (see Chircu and Kauffman 2000; Kraut et al. 1998; Steinfield et al ; 2000; and Molla and Licker 2005). The notion that they will be modified in this way is implicit, however, in speculative considerations of the development of e-commerce in developing countries. Empirical research in Europe suggests that the outcomes for firms that adopt e-commerce can be enormously varied and that they are likely to be informed by prevailing commercial practices and the structural features of specific sectors, rather than by any elixir of technology (Hawkins, et al. 2000).

One examination of e-commerce in developing countries focused on two sectors: garments and horticulture (Humphrey et al. 2003). When the research was conducted, e-marketplaces supporting these two sectors were in operation. Seventy-four smaller and larger firms in Bangladesh, Kenya, and South Africa were selected in this interview-based study. If firms in these countries are to make use of e-marketplaces, they need to have a means of accessing networks. Despite the generally acknowledged weakness of the telecommunication infrastructure in Bangladesh, Kenya and South Africa, all the firms in the sample had some means available to them to access the Internet. Despite the availability of e-marketplaces providing a range of services, the majority of the firms had never registered with one of these services (77% of 74). The availability of e-commerce was, nevertheless, influencing the way that the firms were doing business. E-mail was the most important Internet application, but it was being used to facilitate communication with *existing* customers and suppliers, rather than with new ones. In this study, even though more than half of the firms had websites, more than 75% of respondents said they rarely used the Web to obtain general information or information about specific customers or suppliers. Nearly all of them wanted to continue to rely mainly on interpersonal networks and face-to-face meetings to exchange information.

The observations of several respondents are instructive. A South African garment intermediary respondent, owned by a large Hong Kong trading group, observed that although email was used extensively, e-commerce was not supporting transaction activity. In addition, he suggested that “we don’t want to work with the other 10 per cent”, because these are micro-firms. A South African horticulture company had an Internet site catering to domestic producers. Although it was acknowledged that there were technical problems, the main difficulty was that “the industry is perhaps naive and uniformed. The potential benefits need to be proven”. E-commerce was expected to grow, but it was not expected to become seamless because “if you shorten the supply chain you will likely short-

change yourself". Face-to-face interactions remained essential so that deals could be negotiated on the basis of trusted relationships. In Kenya's horticulture sector a small company in the sample was exporting fruits and vegetables. It was using the Internet to sell its products and had registered with an e-marketplace. However, the respondent said that "we get constant requests, orders" but there are payment problems and the company was unable to satisfy requests for orders for capacity reasons. In another Kenyan company in the same sector, a respondent highlighted continuing infrastructure problems, saying that "sometimes the line works, sometimes it doesn't – it's a nightmare".

What we find in the empirical evidence is a cluster of problems and issues that come under the rubric of the 'politics of technology'. E-commerce does not seem to offer high returns to firms in developing countries as compared to other ways of conducting trade – and e-commerce on its own is unlikely to help many small firms to enter global markets (Humphrey et al. 2003). In this study there was evidence of growing use of supply chain management software. However, even where innovative e-commerce applications were being developed, the importance of trust, face-to-face interaction, and offline transacting was emphasised. International market conditions were being influenced more by existing market structures and commercial practices than by the introduction of new technologies. This is a reflection of the 'politics of technology' and it is these circumstances and constraints that should be the principle focus of any inquiry into how connectivity influences the commercial positioning of firms in developing countries. Although investment in ICTs is important, choices should be based on what is best for each sector and firm in a given country – not on abstract assessments of technological potential. Just as in the case of the PIC and other access technologies, there is too little evidence of serious attempts to discover what those with few resources, themselves, wish to prioritise.

Conclusion

I have highlighted the importance of examining the wider politics of technology in order to consider how future initiatives to address digital divides may have a greater chance of reducing poverty. The initiatives in the coming years will need to be a reflection of people's aspirations and their objectives for development. It is imperative that actions aimed at building knowledge societies acknowledge that technologies – whether the PIC or mobile phones or radios – "must … avoid giving the impression that information, knowledge and communication are magic wands. They are essential but not sufficient elements to address poverty". Approaches are needed "that represent a process of dialogue, information sharing, mutual understanding and agreement, and collective action". The aim should be to

"link private sector interests and expertise into a new generation of investment in which the empowerment and development of people is central"[6]. This is a very tall order. There was little evidence of large-scale efforts to develop this kind of approach following the *Missing Link* Report. While there is more discussion of the need to take the politics of technology into account today, the illustrations in this chapter suggest that it is still very difficult to design and implement technologies and services that are responsive to people's needs in poor communities.

It is essential to assess ICT initiatives in terms of the incentives guiding the corporate actors into new markets and in terms of whether these initiatives are likely to introduce new ambiguities for those affected by their technological choices. When such initiatives seem likely to introduce new forms of exclusion or disadvantage, complementary action is needed. A starting point for analysis of the ambiguous outcomes of connectivity is to apply Amartya Sen's (1999) concepts of capabilities and entitlements. These concepts provide a departure point from which to debate the relative importance of achieving connectivity for the poor in a way that takes people's expressions of their needs into account. Sen argues that citizens have an entitlement to acquire certain capabilities because they are the underpinnings of the freedom of citizens to construct meaningful lives. In discussions about investment in ICTs, it can be argued that access to online content or the capabilities for sending and receiving emails or text messages amplifies the 'real choices' that people have available to them. This provides a justification for investing in the technologies that enable connectivity. However, even if there is a consensus on this point, this offers no indication of the relative priority that such investment should receive as compared to other courses of action (Garnham 2000).

Sen suggests that decisions about priorities must be established through an evaluation process involving a public and highly political discussion among the relevant stakeholders. Heeks (2002a,b) points out that much can be accomplished by extending existing technology initiatives to citizens through creative organisational and investment strategies. However, it is important to decompose what is meant by ICT and to ensure that choices about technologies are responsive to people's needs, as they understand them. Without evaluation, potential users are simply responding to the latest package of technology – such as the PIC or a prepaid mobile phone – without regard to the specific needs that they might have expressed if such an evaluation had been conducted. All forms of connectivity have a politics. If investment in connectivity leads to further divides in the populations of poor areas from the wealthy areas, thereby reinforcing pre-existing inequalities associated with gender, social status or earning capacity, then the consequences of such investment will be highly ambiguous and will further heighten the fragility of emerging knowledge societies.

The WSIS civil society declaration (Civil Society 2003: 2) put people and poverty reduction at the centre of its concerns: "at the heart of our vision of information and communications societies is the human being. The dignity and rights of all peoples and each person must be promoted, respected, protected and affirmed. Redressing the inexcusable gulf between levels of development and between opulence and extreme poverty must therefore be our prime concern". By coupling a consideration of individuals' entitlements to connectivity with a consideration of the politics of technology and their ambiguous consequences for the poor, there will be a better opportunity to evaluate when a high priority should be given to investment in connectivity and content creation and when other development concerns should take the lead. The responsibility of decision makers is to conduct an evaluation of the kind that seeks to understand people's needs and development aspirations as well as their entitlements.

Research on e-commerce in developing countries is beginning to highlight how different the needs of those who are intended to benefit from connectivity are as compared to the perceptions of those needs by many technology designers. For example, the ambiguity of connectivity is visible in research documenting the threat of e-commerce to the livelihoods of micro-business entrepreneurs in the mueblista (furniture) industry in Chile[7]. New e-commerce services are bypassing micro-entrepreneurs in villages in rural Chile who have been earning a livelihood in this industrial sector. The implementation of e-commerce has meant that larger suppliers that are better prepared to trade using their access to the Internet have captured the micro-entrepreneurs' markets. The micro-entrepreneurs have few resources to enable them to retrain to enter other types of industrial activity. While the urban, larger firms are benefiting from connectivity, despite its availability to the rural micro-entrepreneurs and ICT skills training initiatives, they are not capturing the potential advantages.

This illustrates the profound importance of the politics of technology, the ambiguity of connectivity, and the fragility of knowledge societies. People's livelihoods do not change because of technology; they change in the light of the way technology becomes embedded in the overall context of the local and the global. Where that context is consistent with poverty reduction, then it is possible for the newer and older technologies to make positive contributions. Discussion in support of reasoned decision-making about entitlements and responsibilities with respect to connectivity must start from a detailed appreciation of those contexts.

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2. Millennium Goal 8. Develop a global partnership for development – Target 18. In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.
3. Before taxes and without a video monitor. AMD is using its Geod chip, typically used for making computer kiosks and set-top boxes for broadband connections. The PIC uses one watt of electricity and runs without a fan, provides 128 MB of memory and a 10-GB hard drive.
4. In this case, the low cost computer would have a 14-inch/35.5cm colour screen, AMD chips, and run open source Linux software.
5. www.clickz.com/stats/web_worldwide/ accessed 21 Sept 2005.
6. Quotations here are from an online moderated discussion, 'Measuring the Impact of Communication in Development Projects and Programs', January-February 2005. Extracts from comments by participants are anonymous and permission to use the texts was sought from the World Bank moderators.
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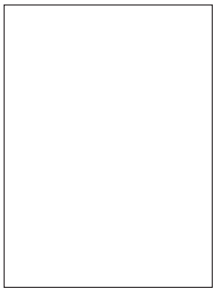

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