The Internet and Socio-economic development: Exploring the interaction

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Abstract

In this paper, we attempt to gain an understanding of the current and potential impact of the Internet on the four-fifths of the world's population living in developing countries, two-thirds of them poor. First, we attempt to put today's rapid advances in information and communication technology in a broader debate about development and the role of information. Next, we explore the interaction between the Internet and key dimensions of development using empirical data to support the argument that the Internet can only become a tool for socio-economic development if it is applied in a way that will benefit society at large and vulnerable groups in particular. Finally, we discuss some key policy implications of Internet diffusion and usage which governments of developing countries will have to address. These include enabling the creation of relevant knowledge on the Internet and the acquisition of the necessary skills and capabilities to use the technology in a way that is compatible with the local culture.

Introduction

The importance of expanding the access of developing countries to the Internet has been recognised by governments and international agencies with increasing consensus that the Internet and related telecommunications technology should be regarded as strategic national infrastructure (Kenney, 1995; Mansell & Wehn, 1998). This has led to significant rates of increase in the regional distribution of Internet host connections over the last few years as reflected in the figures of regional Internet hosts in January 1998 shown in Table 1. The establishment of such strategic infrastructure is considered critical for developing countries where the marginal impact of improved network communications can be very high, leading to improved economic productivity, governance, and education, health and quality of life, particularly in rural areas (Adam, 1996; Press, 1996). For example, in Africa, the growth of small scale, low cost electronic networks has been influential in building an academic and research community within the continent that discusses and shares topics of concern (Adam, 1996; Panos, 1998). Another example is the networking project launched by the Commonwealth Secretariat in 1990 called COMNET-IT. The project aims to improve government collaboration within the commonwealth group of countries using electronic networks to facilitate the sharing of data on administrative reform experiences (Qureshi & Cornford, 1994). These findings suggest that wider connectivity within developing countries would improve the overall information infrastructure in these countries and thereby promote positive changes in socio-economic development.

Despite the increases in the provision of information services that are available through the Internet for users in the developing world, there is considerable scepticism regarding the potential of the technology for socio-economic development. For example, most Internet diffusion statistics, although impressive, tell us little about Internet density since they do not take into account the size of the population in each country or region. More recently, Harris (1998) computed rates of Internet density by taking into account the size of the population in each region. His figures, shown in Table 1, reveal that North America has 168 times the number of hosts than Africa, but that Africa has 396 times the number of people per host than North America. Even when Internet access is available, Mansell (1998) argues that the value of a technology that permits communications with a distant correspond across the world is of limited use to someone grappling with the day to day problems of poverty and hunger. Another fear often expressed in the literature is that the poor financial, technical and human resources in developing countries would perpetuate further ties of dependency such that developing countries would be kept economically subservient by the need for western equipment and expertise (Wehn, 1998).

In this paper, we examine the extent to which the knowledge and information revolution manifested today in the Internet will affect the quality of life of more than 4bn. people in developing countries, particularly the poorest and most vulnerable among them. Connecting countries is just the beginning and, though expensive, perhaps the easiest part. Individuals, organisations, even countries must have the incentives and the capabilities to use information effectively. Especially for the poor and vulnerable, strengthening their capability to receive and use knowledge will require special effort, and knowledge that comes from outside will need to be adapted to fit local contexts and needs. This perspective suggests that development must focus on alleviating poverty and on creating a social environment that is conducive for providing universal access to basic welfare systems. This view differs significantly from the

traditional form of development in terms of stages of economic growth. The impact of the technology should therefore not be measured in terms of the number of connected individuals alone, but also in terms of accessibility and contribution to social progress (Uimonen, 1997).

This paper is organised as follows. The next section traces the evolution of development thinking discussing the role of information and knowledge in achieving more sustainable, equitable forms of human development. Section three raises key issues related to the diffusion and usage of the Internet in developing countries in terms of various dimensions of development discussed in section two. The final section explores some policy directions for governments in developing countries in terms of creating, disseminating and using the Internet in a locally-relevant way.

Trends in development thinking

Behind every policy intervention lies some theoretical assumption, either overt or covert, about the nature of development. In this section, we trace the evolution of these assumptions and aim to develop a conceptual framework to guide us in categorising issues of relevance in the interaction between the Internet and socio-economic development.

There has been considerable debate over the definition, explanation and practice of development over the past few decades. The earliest theoretical approach was the notion of development as an evolutionary experience. It was assumed that developing countries should aspire to achieve the type of society that existed in the developed world by passing through a number of stages of economic growth similar to those which the countries of western Europe had experienced (Rostow, 1960). The goal of development was conceived of primarily in terms of economic growth measured using national income indicators (Hettne, 1990).

During the 1960s and 1970s, there was increasing evidence to suggest that while a few developing countries managed to increase their growth rates and restructure their economies, the majority were unable to achieve such results plagued with increased poverty, growing indebtedness, political repression, social inequality, displacement of traditional values, and environmental damage (Conyers and Hills, 1984). This evidence led to the realisation that one of the main causes for underdevelopment was dependency from two perspectives. First, in terms of the ability of an independent developing society to make decisions within the prevailing international power stucture. Second, in terms of social equity within the developing country by empowering the poor with basic needs for human development (Rodney, 1972; Amin, 1974). These experiences resulted in a redefinition of the goals of development with much greater emphasis on non-economic aspects. Hence, development came to be conceived of and measured not only in economic terms, but also in terms of social well-being and political structures, as well as in terms of the physical environment (UNDP, 1991). This has led to a broader conception of human development in the UNDP Reports on Human Development published annual since 1992 which have increasingly taken into account alternative dimensions of development such as human autonomy, equity, sustainable development, empowerment, and cultural identity.

The emergence in the 1970s of the neo-populist tradition forcefully articulated by non-government organisations and others gave much importance to the views, desires and

ambitions of those about to be developed. Such views offered an alternative development strategy to the linear growth model. This alternative view was based on the notion that developing countries have their own trajectory of development which did not necessarily follow the same pattern as experienced by the advanced, industrialised countries (Hettne, 1990). The neo-populists argued for the retention of traditional peasant agricultural systems and small-scale enterprises, on direct policies aimed at reducing poverty among target groups of the population, and on local sustainable development projects. For example, Julius Nyerere's attempt to establish a revitalised and improved traditional African socialism in Tanzania in the 1960s and 1970s is a good example of neo-populism in action. Similarly, the basic needs policies implemented by national governments and international agencies during the 1970s gave higher priority to redistribution of wealth through programmes directed at poverty alleviation, rather than economic growth. The main message of the sustainable development movement that arose in the 1970s and 1980s was that development depended on the ecology and culture of the locality rather than on a western model of economic growth. More recently, in the context of Africa, McGeary and Michaels (1998) observe that a new spirit of self-reliance is taking root among many Africans as they seize control of their destiny through local models of development.

New information and communication technologies manifested today in the Internet emerge as a new challenge for developing countries. This challenge has been perceived in two related ways. First, information has begun to be projected as the `engine' of development commensurate with traditional stages of growth definition of economic development. This notion is based on a broad vision regarding a new stage of development centred around the production, diffusion and usage of information and communication technologies throughout society - a vision first took hold in the United States in the 1960s against a context of increasing prosperity and automation. (Bell, 1973; Castells, 1989; Castells and Hall, 1996). In recent years, many writers have begun to calculate the extent to which individual nations had achieved `knowledge societies' using indices related to the consumption and production levels of information technology, including an Internet host index (Kenney, 1995; Mansell and Wehn; 1998). This model of development has resulted in telecommunications and global networks becoming important issues for discussion amongst government policy-makers and international agencies (Panos, 1995; Press, 1996).

Second, there has been increasing recognition that the achievement of more sustainable, equitable forms of human development does not depend on the existence of internet connections alone, but on the acquisition and usage of information and knowledge (Talero and Gaudette, 1995; Rogerson and Itoh, 1998; Mansell, 1998). The recent World Development Report examines the role of knowledge in promoting socio-economic development. It begins with the realisation that economies are built not merely through the accumulation of physical capital and human skill, but on a foundation of information, learning and adaptation. It is therefore necessary to understand how societies acquire and use knowledge in various dimensions of development (WB, 1999). Incorporating a multi-faceted approach to development, Press (1997) brought evidence to show a positive correlation between the number of Internet hosts in a country and the UNDP Human Development Index.

While complex development goals cannot be solved by the existence of Internet connections alone, it is undeniable that some kind of interaction between the diffusion and usage of this technology and development is occurring. As increasing amounts of information about

scientific and technological developments are now available only on the Internet, this technology appears to have opened up new options that influence the character of socio-economic development. At the same time, the political, social and cultural values embedded within development goals are shaping the development and use of the technology. It is this chicken and egg interaction between the Internet and socio-economic development that will be explored in the remainder of this paper.

Internet usage in developing countries - Key issues

As the use of the Internet widens beyond the research and academic community, its developmental impact on developing countries needs to be closely monitored. This section explores the interaction between various dimensions of development discussed in the previous section and Internet usage. We discuss these issues under the broad dimensions of economic productivity, telecommunications infrastructure, social equity, cultural identity, empowerment of marginalised groups, democracy, and sustainable development.

Economic productivity and infrastructure development

Commercial connections are the fastest-growing component of the Internet today as more and more companies are establishing closer links with customers, business partners, vendors, and information resources via the network (Press, 1996). However, to date, there is little research carried out about the impact of Internet usage by commercial organisations in developing countries although many commentators have speculated that the Internet represents a tool for improved economic productivity. For example, the World Bank estimates rates of return to the local economy of between 13 and 20% (World Bank, 1995). Jayaram et al., (1997) predict that the Internet will enable local companies to market their products and services abroad and thereby overcome one of the most important barriers to global competitiveness facing developing countries. They observe that while companies in India find it prohibitively expensive to advertise extensively in print publications, advertising on the Internet is relatively cheap. Along similar lines, in a recent study on Argentina, Buttazzoni (1997) reports that while the total number of Argentinean companies that have set up web sites represents only a small proportion of the total number of businesses in the country, these companies are gaining greater exposure in the global market. Network connections also promise improved regional collaboration and competitiveness in trade and research. The Common Market for Eastern and Southern Africa (COMESA) and the United Nations Conference on Training and Development (UNCTAD) have both commented on the positive potential impact of trade information networks on interregional and intraregional trade (Adam, 1996).

However, despite the potential of Internet connectivity for commercial activity, there is evidence to suggest that the return on investment in information technology investment in developing country organisations is poor. For example, a recent survey carried out by Dewan and Kraemer (1998) reveals that together with investment in information technology, there is need to ensure that organisations have the capacity to restructure themselves to promote efficiency and effectiveness. Countries with strong managerial capabilities such as the newly industrialising economies of SE Asia have been able to

acquire and retain competitiveness and build adequate bases to keep up with the pace of progress by devoting major efforts to investigate indigenous managerial trends (Montealegre, 1996). These findings suggest that more research is needed on the way the Internet is influencing economic activities, on how skills and capabilities can be built up to tackle local and national problems, and on why some initiatives to use the Internet succeed while others fail.

Health

We are beginning to witness the application of networks to healthcare in developing countries. One such example is HealthNet which links health care workers in 16 African countries and 4 Asian countries with each other and with colleagues and databases in developed countries using a variety of communications protocols (Panos, 1995; Panos, 1998). The network provides e-mail, a list server, electronic publications and database access. Another example is the Programme for Monitoring Emerging Diseases mailing list established during the recent Ebola virus outbreak in Zaire by 60 researchers in September 1993. Today, the network has over 1600 members in 80 countries. The list first heard of the outbreak in 1976 and circulated information from various international health organisations. Information was passed to and from affected countries helping to control the spread of the virus and to treat the disease. For example, Zambia was able to use the Internet to check details about similar cases in the Copperbelt region of the country (Press, 1996). In general, most connectivity that takes place in HealthNet is from developing countries to information resources in developed countries. Intranational connectivity amongst developing countries themselves is still very sparse although one can imagine many useful networking health applications in developing countries where barefoot doctors and other paramedics serve poor communities and rural areas.

An increasing number of Internet sites concerned with health matters in Africa appear to be relevant for the achievement of long-term socio-economic development. For example, Asiru (1998) recently analysed data from a random search of 100 Internet sites concerned with health matters in sub-Saharan Africa. He found that 58% of the sites were sponsored or funded by non-government organisations that had strong links with African communities and academics.

Education

Networks in developing countries have usually started in the university and research community where their impact has been positive. For example, a survey undertaken in Ethiopia, Uganda, Zambia and Senegal on the impact of electronic communications technology shows that academic and research institutions have been able to conduct joint projects effectively, improve resource mobilisation, and carry out research between distant sites inexpensively (NRC, 1996).

The use of networks for primary and secondary schools has also revealed some interesting examples. Two countries which have good examples of education networks are Cuba and Chile. Both have strong records of investment in human capital and have continued allocating resources to education networking. For example, in 1992, the

Catholic University in Chile embarked on a five year project to develop and evaluate an elementary school network. Today, there are 144 networked schools each having between 3 and 10 computers and an Ethernet, some gaining connectivity to the Internet. The network provides a variety of services – student and teacher newsletters, educational software, curriculum notes, computer conferences, e-mail, and access to databases. The network has been evaluated and shows a significant effect on student creativity. With World Bank funding, the goal is to reach all secondary schools and half of all primary schools in the country by 2000. Cuba's school networking project begun in 1987 and stressed grassroots participation of schools in rural areas. There are now 150 centres spread around the country, 80 of which have modems used to dial into PCs running Unix in Havana for onward connection to the Internet (Press, 1996).

In recent years, there has been increasing interest in the use of electronic networks to support distance learning around the world by enabling computer-media conferencing and collaborative learning to take place, and by providing access to electronic libraries and to the multimedia education market (Hall, 1996; Panos, 1998). Distance learning has been earmarked as especially relevant for developing countries where there is a need to educate large numbers of geographically dispersed people (UNESCO, 1985). However, at the same time, some commentators have argued that the generation of distance learning material is capital intensive, and may therefore lead to the exclusion of the mass of the population in developing countries from this form of education (Bates, 1993).

Poverty alleviation

Harnessing networks to deliver benefits in developing countries means ensuring that those facilities are responsive to the poorest and most disadvantaged communities. Electronic communication can assist in the management of crises and in poverty alleviation. One such effort is the Greater Horn of Africa Electronic Communications Network project funded by the United States Agency for International Development (USAID) which aims to link member states of the region in order to exchange crisis-related information. Another potentially beneficial area for the application of electronic networks relates to the problem of food insecurity in Africa. One of the main problems characterising the African economic situation is food insecurity which contributes to local competition for resources between groups often resulting in civil war. Electronic networking can deliver critical information to farmers, extension workers and researchers fighting crises caused by famine (Adam, 1996; Panos, 1998).

In terms of poverty alleviation, the Village Internet Programme of the Grameen Bank in Bangladesh aims to promote poverty alleviation by reducing migration from villages to cities, creating IT-related job opportunities for the rural poor, and by creating familiarity with computers among the rural population of the country (Grameen Bank, 1998). Another example is the Honey Bee network established in 1990 as a pilot experiment in India. This electronic network aims to create a repository of indigenous knowledge and to link knowledge-rich grassroots innovations within a region in order to promote activities within poor communities which are both economically and ecologically viable. Green technologies such as herbal pesticides, herbal drugs for animals and humans, and vegetables dyes are only some of the ideas in which the network is very rich (Gupta,

1997).

Of key importance for the poor in developing societies is not merely the provision of connectivity or access to knowledge, but whether relevant knowledge is disseminated (Mansell, 1988). Indigenous knowledge concerning health, education, and poverty alleviation is rarely documented but it is a useful resource for the creation, dissemination, and adoption of new technologies.

Empowerment of marginalised groups

The Internet offers an opportunity for direct communication between developing countries and many activists and non-governmental agencies (NGOs) that share political goals are connected into the electronic web. There are many examples of activists who have used the Net to help empower marginalised groups throughout the world and have established grassroots nets for this purpose by posting debates and policies on bulletin boards in order to solicit responses and organise protests. In another example, NGO womens' group charities use e-mail to keep in touch with women in Bosnia. It can be extremely difficult to make a phone call to find out what aid they need, but e-mail keeps on trying until it finds a route to deliver the message (Annis, 1991; Frederick, 1994).

Perhaps the organisation that has really helped to empower marginalised groups throughout the world is the Association for Progressive Communications (APC) which has been a leader in co-ordinating the development and operation of networks devoted to peace, ecology, human rights, and other `progressive' causes since 1989 (Frederick, 1994). The APC network has become the main medium through which NGOs obtain reports and official documents to intervene in policy-making. By August 1995, there were 18 member networks serving over 31,000 activists, educators, and NGOs in over 133 countries. In September 1995, APC was granted Consultative Status Category 1 with the Economic and Social Council of the UN enabling the organisation to have a permanent representative at the UN assembly.

Web upon web of grassroots groups are forming as poor people are not only better organised, but better connected to each other, to the state, and to people abroad. These new social networks which are enforced by new electronic connections can generate powerful channels of political expression. However, further research is needed to indicate to what extent these knowledge networks have contributed to development in different countries.

Democracy

The prevalence of democratic institutions in a country is considered a key criterion for socio-economic development as reflected in the recent development indices. Some writers have argued that Internet connectivity promotes democracy (Press, 1996; Mueller & Tan, 1997). Mueller and Tan assume that the Internet encourages democracy by providing people living under dictatorship with outside information and ideas, and by enabling them to share ideas and to coordinate political activity within their countries. For example, during the attempted coup in the Soviet Union in August 1991, APC set

up links through the Baltic States onto NordNet in Sweden and then onto the London based GreenNet which in turn kept an open link with the rest of the APC network allowing information flow from Moscow and Leningrad. Along similar lines, the Net has been used for both inter and intranational communication during events in Tiam An Men Square in 1993. It is precisely the difficulty of political censorship on the Net that has been an invaluable tool for activists and journalists involved in sensitive political topics.

However, this freedom of expression made possible via the Internet poses a serious dilemma for authoritarian regimes as it threatens to undermine their control structures. In many parts of the world, strong government control exists on electronic communication. For example, in China, Singapore and Vietnam plans have been announced to control information that the Internet brings to their territory. China's Post and Telecommunications Minister announced that by linking to the Internet, absolute freedom of information is not intended. But it remains unclear how China plans to achieve this (Clough, 1996; Mueller & Tan, 1997). Singapore plans to introduce two or three levels of filters applying different levels of censorship for academics, business people and the general public.

Research needs to be carried out to explore the link between the openness of information and democracy. Improved telecommunications and the Internet undermine the capabilities of authoritarian governments to restrict flows of information.

Sustainable development

The UN Conference on Environment and Development held in 1992 saw an unprecedented level of involvement from international agencies and NGOs in policy-making. For example, the UNDP is currently involved in the Sustainable Development Networking Project for linking users and suppliers of information on sustainable development. The programme has helped to provide information to some governments on environmental hazards such as haw to safely dispose of toxic material. The UN has recently commissioned a feasibility study for setting up a sustainable development networking project in China (UNDP, 1995).

Another example of Internet usage promoting global policy was in 1994 following Clinton's announcement that he was about the sign the convention on biodiversity. Indian environmental activists hijacked the convention that was for the benefit of industry after they had received a draft copy of the announcement over the Net. These activists contacted the Malaysian office of a development media organisation and their message was posted on various bulletin boards on the Net. Almost immediately, protest faxes and e-mail messages from NGOs around the world were being sent to the White House.

Today, the Internet is playing a significant role in creating awareness about issues of sustainable development. For example, the rapid and concentrated economic growth of the type occurring in urban centres in developing countries is often at the expense of the environment. For example, UNESCO is commissioning research institutes around the world to focus attention on the key issues of managing megacities in developing

> countries. These issues are being electronically documented and it is expected that by 2000, the database of core issues would have reached a signicant size to be offered to the president of UNESCO. The Internet will be used to stimulate and organise an easy exchange between workers in the field, including scientists, planners, UN experts and consultants (Madon and Sahay, 1998).

Economic productivity, telecommunications infrastructure, self-determination, social equity, welfare, empowerment, democracy and sustainable development form the major components of socio-economic development. This section has provided a systematic way of categorising these development imperatives discussing each one in terms of its interaction with Internet usage.

Discussion

In this paper, we have explored the current and potential possibilities of using the Internet in developing countries. By analysing some of the issues to be considered within the wider framework of key development imperatives, the author hopes to sensitise policy-makers on the issue of social responsibility in the creation, dissemination and usage of knowledge. Drawing on the accumulated research on the social uses of technology (Castells, 1996; Ciborra, 1996), we argue for the need to consider the technology as malleable, and thus adaptable to the local context. In this section, we outline areas where governments could play a role in adapting Internet technology in a way that will benefit the nation within the international power structure and benefit vulnerable groups to create more equitable development.

The first area is in creating knowledge. For developing countries, there are major trade-offs between creating knowledge locally and acquiring it from abroad. Just because a very large and rapidly increasing stock of knowledge can be tapped quickly through the Internet the issue at stake is the extent to which developing countries should focus primarily on the acquisition, dissemination and use of globally available knowledge or promote the generation of indigenous knowledge. Most of the Net's key resources such as software, information libraries, e-mail and newsgroup services are in English. In countries where only a minority speak English there appears to be a real need to localise interfaces to promote a more equitable network usage (Keniston, 1997). For example, the language question is keenly felt at present in Latin America where indigenous information in Spanish is available on the Internet but foreign sources are likely to be in English. As Internet usage widens beyond the research and academic community, the problem may be serious because the vast majority of the world’s population who do not and will not in the foreseeable future speak English will be excluded from the system.

Many writers argue that indigenous knowledge systems need to become a fundamental building block for the future transformation of societies not only in developing countries but also in advanced countries (Mundy and Compton, 1995; Mansell, 1998). These systems which enable economically poor people to survive have involved blending secular with sacred, reductionism with holism, short term options with long term options in material as well as non-material pursuits. The higher the physical, technological, economic, and social stress, the greater the probability that disadvantaged communities have been able to generate innovative and creative alternatives. However, these innovations have often remained isolated and

unconnected and there is need to establish a network for indigenous knowledge in the vernacular language. The World Bank has responded to this challenge by devoting the 1998 World Development Report to exploring the extent to which developing countries should invest in developing indigenous knowledge rather than making effective use of the rapidly increasing stock of global knowledge (World Bank, 1999)..

A second area for government action lies in disseminating knowledge. Government policy for the dissemination of externally and internally generated knowledge needs to be reviewed. Attention should be given to the openness of global knowledge flows, and to the standards and regulations for the telecommunications industry. Issues of market structure, private ownership, regulation in telecommunications need to be investigated with special emphasis on ensuring greater access for groups and individuals who have not had access to basic telecommunications services, despite long-standing government policies that espouse universal access. A few studies on Internet usage in developing countries have focused on issues related to the inadequacies of the telecommunications infrastructure and the need for major institutional changes in telecommunications infrastructure in developing countries in order to promote usage of the Internet (Ahmad et al.,1996; Barry, 1996; Chapelier, 1996). However, as telecommunications industries in developing countries open up to competition, there is increasing concern about the goal of universal access for those who cannot afford to pay for access or who live in remote areas where it is simply not profitable to provide a service. Some writers argue that liberalisation should take place only after basic communication needs of the majority of the population have been satisfied. However, recent experience calls into question this trade off between universal access and liberalisation. The counter-argument is that demands for universal access and advanced telecommunications services are complementary and therefore attracting private capital is a necessary prerequisite for network development. Several projects have been embarked upon involving foreign telecommunications operators through regulatory bodies (Panos, 1997).

Using the Internet, possibilities are beginning to exist for increased self-determination of individual developing countries and regions within the prevailing international power structure. For example, communication between journalists in developing countries is becoming more prevalent without having to filter news through agencies in advanced industrialised countries. The Pan African News Agency has recently been re-launched from Dakar in Senegal and intends to use the Internet for communication within the region. In 1995, the agency went online and soon expects to have a web page. In Zambia, the Lusaka Post is one of two newspapers available on the web which can be read from anywhere in the world thereby increasing its readership and profile (Panos, 1995).

A third area for government action relates to human resource development for network users. Countries need some capabilities even to follow, assess and select from the global stock of knowledge. Network technicians, while in short supply in developing countries, are being trained in universities and at workshops (Mansell, 1998). But the toughest challenge is training users. The most important networking resource in the US is the user community - the millions of students and office workers who are familiar with the components and capabilities of the computer. These people can easily make the technical and conceptual shift to the Internet. However, the advanced industrialised countries have had some twenty years since the introduction of the commercial personal computers to achieve this level of awareness. In terms of creating awareness amongst the general public in low-income countries, policy-

makers need to decide what level of education deserves most investment in developing countries – primary schools or university? Since literacy drives the information revolution, this would suggest that significant resources need to go to early education. including cost, the need for literacy and technological know-how, and the dominance of English as the Internet language of choice, it is feared that access to this technology is likely to remain the domain of a privileged elite in developing countries (Song and Akhtar, 1995; Mohammadi and Youngs, 1998).

Basic development projects can serve as a channel for the transfer of information and communication skills to the poor (Annis, 1991). A typical development project today concentrates more on training, data handling, software, monitoring and management, and relatively less on hardware and equipment. While most of these projects are designed to deliver services, few are analysed as a means to transfer information or technology to the poor.

Conclusion

The debate over the impact of the Internet on developing countries is not a discrete semantic debate conducted by academics, but has a direct impact on the lives of billions of people. Developing countries who are eager to explore the commercial application of the Internet cannot afford to ignore the social implications of the Internet. The success of the Internet should be measured less in terms of sheer numbers of connected individuals and more in terms of accessibility and contribution to social progress.

Beneficial use of the Internet demands investment in underlying technical infrastructure. It also means investment is social infrastructure and skills to use the technology in a way that is compatible with local circumstances, cultures and abilities. Governments in developing countries will therefore have to make a special effort to address these issues through policies that give the poor better access to knowledge on the Internet, and help them acquire the skills and capabilities to make effective use of it. It is important to note that the term developing countries refers to a large category of diverse nations. The same strategy of Internet diffusion and usage therefore cannot be applied across the board, though groups of countries with the need for similar strategies could perhaps be identified. Thus, greater country to country co-operation to take advantage of the broad range of lessons should be a primary goal. Apart from commercial usage, examining the social impact of the Internet should be a frontier in research for the next decade. This requires combining analysis of economic indicators with other dimensions to investigate how rapid diffusion and usage of the Internet affects the social fabric of developing countries in terms of alleviating poverty, improving access to health care and education, conserving and fairly distributing resources, and strengthening participation in decision-making processes.

Table 1 Rates of increase in Internet host connections in developing countries

Region	No. of Internet hosts
North America	21,540,474
Latin America	241,898
Western Europe	4,793,544
Eastern Europe	350,117
Middle East	73,060
Africa	128,570
Asia	1,705,240
Pacific	836,708
Total	**29,669,611**

Internet Domain Survey, January 1998

Table 2 Regional distribution of Internet host density

	Hosts	Population `000	People per host
North America	21,540,474	285,940	13
Latin America	241,898	448,688	1855
Western Europe	4,793,544	408,675	85
Eastern Europe	350,117	322,697	922
Middle East	73,060	138,927	1902
Africa	128,570	661,062	5142
Asia	1,705,240	3,016,940	1769
Pacific	836,708	53,435	64
	29,669,611	5,336,164	180

Source: Compiled by Harris (1998) using figures of Internet hosts from Internet Domain Survey, January 1998 and world population statistics taken from the World Bank Atlas.

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