

# Should we try to bridge the global digital divide?

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**Abstract** *The standard set of statistics for measuring the "digital divide" involve per capita use of various information and communications technologies (ICTs). Underlying these statistics is an assumption that higher usage per capita would be a good thing, and ubiquitous usage would be a great thing. This article begins by examining poor people's information needs, and noting that poor countries have to provide information infrastructure both to meet those needs and the communications requirements of business and government. The article argues that there will be a role for the Internet as part of that information infrastructure. However, features both of poor countries, and particularly of the poor people who reside in those countries, suggest that the utility of widespread Internet access may be limited. Given that providing widespread Internet access will also be complex and expensive, this suggests the goal of "closing the digital divide" by attempting to reach ubiquitous Internet use in less developed countries (LDCs) might be a costly mistake.*

## Introduction

Ninety-nine point six percent of the populations of South Asia and Africa did not use the Internet in 2000. Only 10 percent of Thailand's Internet users are rural, although rural areas contain 79 percent of the country's population. Both of these figures, and many like them, are to be found in the latest UNDP *Human Development Report* (UNDP, 2001). The report uses low per capita usage rates in developing countries to demonstrate that "it will take years for the digital divide to be bridged" (UNDP, 2001).

The assumption of the UNDP report appears to be that low per capita Internet usage is a bottleneck to development for poorer people and across poorer countries of the world. Higher usage per capita would be a good thing, and ubiquitous usage would be a great thing. It is an assumption

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made in reports on the "digital divide" in the USA – reports such as *Falling Through The Net* by the Department of Commerce – that has been imported wholesale into discussions on the global digital divide. And it is an assumption shared by a raft of recent pronouncements from development practitioners, industry leaders and policy makers – the G-8 at Okinawa, Silicon Valley CEOs at Seattle, developing country politicians at the UN.

This article seeks to take a slightly more nuanced approach to the issue of the "global digital divide". It will begin by examining poor people's information needs, and noting that poor countries have to provide information infrastructure both to meet those needs and the communications requirements of business and government. The article will argue that there will be a role for the Internet as part of that information infrastructure. However, features both of poor countries, and particularly of the poor people who reside in those countries, suggest that the utility of widespread Internet access may be limited. Given that providing widespread Internet access will also be complex and expensive, this suggests the goal of "closing the digital divide" by attempting to reach ubiquitous Internet use in less developed countries (LDCs) might be a costly mistake. Put another way, there is little evidence that ubiquitous access to the Internet would remove the binding constraint to LDC development and allow the world's poorest people and countries to see rapid income growth. By way of conclusion, a policy of benign *laissez-faire* towards Internet rollout combined with active support of appropriate government use of the Internet and access programs for more suitable pro-poor communications technologies is put forward.



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### **The information needs of the poor**

Poor people consider information a necessity, and are willing to spend significant sums in order to communicate. For example, the poor in Chile consider telecommunications such a basic service that they spend more of their income on telecommunications than on water. Furthermore, the average Chilean spends more of their income on telecommunications than on electricity and water combined (De Melo, 2000).

This is not surprising, because those with access to tools of information transfer can increase their incomes, their access to services and their voice in the decisions of government. In Columbia, for example, telephones were introduced in the region of Tumaco in 1994. Within three years, residents reported better trade and business opportunities; reduced unemployment; improved health care delivery and information access; improvements in public safety and security; and an overall improvement in the level and quality of available government services (International Telecommunications Union, 1998a). There are numerous other studies on the positive impact of the telephone on the prices received for crops by LDC farmers and the creation of rural non-farm businesses and employment (Duncombe and Heeks, 1999, International Telecommunications Union, 1998b).

What is true at the individual level is also true at the national level. Improved access to telephony has been found to correlate with faster economic growth in numerous cross-country studies (see Forestier *et al.*, 2001, for a review). And lack of access can see countries falling even further behind. For international transactions, for example, lack of access to communications technologies can cut countries off from trading and investment opportunities. As much as one-half of the difference between Africa's manufactured exports as a share of GDP and East Asia's share could be accounted for by the weak state of communications networks (proxied by the number of fax machines) in Africa (Elbadawi, 1999).

Again at the national level, it is probable that the Internet, the most recent network technology, is becoming a necessary part of the infrastructure of international investment and trade, with e-commerce systems becoming as important to the export process or FDI decisions as the state of financial and port systems. In 1999, global e-commerce revenues exceeded US\$150 billion and are predicted to climb as high as US\$3 trillion by 2003 (Forrester Research, 1999). Companies that do not have access to the Internet will also lack access to e-commerce trading opportunities, and business will become concentrated amongst those who are Internet-enabled. There is already evidence for this phenomenon in the USA – Dell and General Electric, both early to move to online supply chain management, have seen a shrinkage in the number of company suppliers as a result (see Heeks and Kenny, 2001).

Communications systems matter to rich and poor alike in LDCs, and access to the Internet should be a major concern

of enterprises involved in international transactions, then. But what of Internet access for individuals in LDCs? Should it be a major policy goal to ensure universal access to the latest communications technology? If the Internet is a cost-effective tool to meet the information demands of the poor, the answer is clearly affirmative. If, however, Internet access carries high costs and might provide limited benefits, other technologies might be more appropriate to meet the information needs of the poor.

### **Is there strong evidence for the benefits of widespread Internet access?**

At present, policy development regarding the global digital divide is being formulated in a relative vacuum of knowledge. The technology of the Internet is very young, its use in LDCs even more recent. Policy based on anecdote is perhaps the inevitable result of the Internet's novelty. Preliminary "success stories" involving the use of the Internet in individual countries in individual sectors and at the micro level make up nearly all of the evidence that we have of the utility of Internet access in an LDC setting. This anecdotal evidence of cases where the Internet was a cost-effective method of meeting an information need in LDCs is all that can be used to formulate global policy proposals at the macro level calling for widespread access. Such an approach to policy formulation needs to be used with caution, however.

To take an example of one success story, Sakshi, an NGO advocating for women's rights in India, has long lobbied for legislation to protect women from sexual harassment. To bolster their efforts, they requested research support over the Internet from international women's groups. With the help of this support, Sakshi succeeded in having landmark sexual harassment legislation passed in India in 1997 (Association for Progressive Communications, 2001). There are numerous other examples – farmers using the World Wide Web to check crop prices, coffee growers selling direct to US consumers via the Web, artisans with e-commerce sites, doctors consulting over the Internet, environmental groups lobbying governments through mass e-mailings (see Grace *et al.*, 2001, for a review).

The Internet can be a powerful tool to help improve social conditions, then. Yet it is a big step to argue based on such stories that the Internet will be a powerful force for growing social inclusion and greater income equality worldwide. To go from anecdote to universal application, we have to ask "how replicable is this anecdote" – will it be repeated all over the world? In how many cases will the Internet make the difference between social exclusion and inclusion?

It is worth revisiting the Sakshi story here. Knowledge of sexual harassment cases and legal precedents that was collected over the Internet was one element needed in order to get the anti-harassment laws passed. But a lot else was needed besides. Sakshi staff skilled in legal argument and in

drafting writs. A receptive Supreme Court with an institutional setup that allowed for NGO submissions. An international network of support that provided good advice at low or no cost. At a more basic level, Sakshi needed money to pay staff who were literate, English-speaking and had computer skills, it needed electricity, telephone and road connections – the list goes on. But it is an important list, because most poor people in the world are not literate, let alone computer-savvy, English speaking legal experts. Most poor people do not have access to the physical networks required for Internet use, nor the human networks providing quality, free advice that is relevant to their concerns. Many poor people in the world live in countries where the supreme court would not be receptive to NGO interventions, and unwilling to pass sexual harassment laws.

The same lesson holds true for other anecdotes of the Internet's successful utilization in LDCs. The success of these cases required a range of factors beyond the technology of the Internet that are extremely rare amongst poor people in LDCs. These basic requirements include access to equipment and infrastructure, language and literacy, technical skills and support and a range of relevant applications of the technology.

### **Access barriers to the Internet**

Turning first to access to infrastructure and equipment – a telephone line, computer, modem and electricity – the majority of the poor do not have this access. In South Africa, 0.6 percent of households in the poorest quintile have access to a telephone (as compared to 75 percent of the richest income quintile) (World Bank, 2000). In Tanzania, only 0.5 percent of the poorest households have access to electricity (World Bank, 1996). Access to computers is even lower.

One reason for the low rate of access to networked infrastructure such as electricity and telephony, and also a reason to assume that it will be very expensive to provide in the future, is that 69 percent of the population in low income countries is rural (World Bank, 2001). It is far more complex to provide networked services where population densities are low (and even more where the geography is difficult – mountainous or forested). Fewer consumers per square mile translate into the need for much more infrastructure per person, and so higher costs. Combined with lower incomes in rural areas, this makes the economics of rural network provision unfavorable.

Universal access programs which focus on the areas that are least economical to serve provide an indication of the greater complexity of providing network access to rural and remote areas. Perhaps the most efficient recent attempt to provide universal telephone access to citizens of a country occurred over the last few years in Chile. There, the government auctioned subsidies to the lowest bidder amongst private companies that committed to provide public

telephone services to areas previously lacking access. The average subsidy country-wide required to provide public access was about \$10 per newly served person. But subsidies rose to around \$100 per person in areas with a population density of under ten people per square kilometer (see Kenny, 2002a).

Such population densities are common in countries that are home to the world's poorest people. A brief look at the atlas (John Bartholomew and Son, 1989) suggests that there are at least nine African countries where the majority of the land is home to fewer than one person per square kilometre. The majority of land in most of the rest of the continent is occupied by fewer than 10 people per square kilometre. The same is true of Latin America and Asia – with the exception of the Indian subcontinent and the Eastern provinces of China.

The Internet requires more than just telephony – at the least, an immediate source of electricity, computers, modems, an ISP connection, skilled technical support. This means that the economics of Internet provision in rural areas are even more complex than those for basic telephone service. LINCOS' off-grid solar powered telecentres providing Internet access in rural Costa Rica have a set-up cost of approximately \$20,000 per computer for a six-computer center, for example. Ongoing costs excluding manpower were approximately \$5,000 per computer (Shakeel *et al.*, 2001). If capital costs are spread over five years (with no allowance for interest payments), this suggests an annualized cost of \$9,000 a year. Assuming, based on figures from Ghana, that a technician to support the center would command a salary of at least \$6,000 (Africa Internet Forum, 1999), this brings annual costs per Internet-enabled computer up to \$10,000.

Compare this figure to potential communications expenditures amongst poor people in developing countries. The poorest quintile in Chile are willing to spend approximately 2-3 percent of their income on communications (De Melo, 1999). Assuming the same holds true for the 1.5 billion people worldwide living on a dollar a day, this suggests maximum yearly communications expenditures of approximately \$10. If all of this expenditure went to Internet access, then 1,000 users would be required to support each Internet-enabled computer. If the technician kept the center open eight hours a day for 300 days a year, each user would have one two-and-a-half hour slot per year to access the Internet. At a population density of ten people per square kilometer, the average user would have to walk about two hours each way to reach the center. At a population density of one person per square kilometer, the walk each way would take most of a day. It is not clear that this level and quality of Internet access is either sustainable or that valuable.

It is likely that the costs of rural Internet provision will fall dramatically over the course of the next few years. Solar

power, computers and communications networks connections are all dropping in price. Combined with economies of scale in the provision of telecentres, costs might drop by as much as two thirds. Nonetheless, this still suggests the average user would have access to the Internet for a total of perhaps eight hours per year. While this might be enough for basic communication needs, it would not support extensive e-learning, e-commerce or even entertainment uses of the new technology. Even assuming no other barriers to the technology's use, eight hours Internet access a year would not be a "transformative" level of connectivity, by any means. To support a "transformative" level of access for the poorest would require significant subsidy rates. One hour per week of access, for example, would require a subsidy of over \$50 per capita per year for those living on a dollar a day – or about ten times public spending per capita on health in low income countries (estimated from World Bank, 2001).

### **Usage barriers to the Internet**

Problems with the cost and complexity of physical access to the technology of the Internet are probably not the most significant barriers to high utility of the technology for the poorest, however. For example, the average person living on a dollar a day is illiterate (Kenny, 2002b). The Internet has the power to convey sound and video (although that power is much diminished in an environment of slow connections and frequent line-drops), but much of its information is textual. Given that, illiteracy poses a major barrier to Internet use.

The majority of those living on a dollar a day also speak a minority language in their own country. Even fewer speak English, the language of 72 percent of the world's Websites (Kenny, 2002). Many of the languages of the poor are almost completely absent from the Web. Take Igbo (Ibo), a language spoken by 17 million people in Nigeria. A search that I conducted, lasting two hours – or about the average yearly length of access currently affordable by people living on a dollar a day – came up with just five sites: a translation of the Universal Declaration of Human Rights; a translation of a religious document called "the four spiritual laws", a translation of the food pyramid, a two-page Igbo phrase book and a prayer manual. There are certainly no Web-sites offering an automatic Web-page translation service from English to Igbo, and so an Igbo speaker would be limited to these five pages on the Web. It might be questionable if access to these five documents is worth \$10,000 per enabled computer per year.

Not surprisingly, given the lower utility of the Internet to speakers of minority languages, there is a significant under-representation of non-English speakers amongst the world's Internet users. Results from a recent study conducted in Tokyo, Beijing, Seoul, Bangkok, Singapore and Jakarta suggest that English speakers were two to four times more likely to use the Internet than the non-English speaking

population (Kenny, 2002b). It is also unlikely that the disadvantaged status of poor, minority language Internet users will change in the near term. There is a high fixed cost of Web site creation (as demonstrated by the number of failed Web site companies in the recent dot com crash), and a small language group of predominantly illiterate people living on a dollar a day are hardly an attractive market for e-commerce or content providers.

Language and literacy concerns, combined with the technical skills required to fully utilize the Internet, help to explain the overwhelming dominance of the educational elite amongst users in the developing world. Of Ethiopian Internet users, 98 percent had a university degree, this in a country where 64 percent of the population is illiterate (Africa Internet Forum, 1999). Again, it is unlikely that the necessary technical skills for Internet use will become widespread amongst the poor in LDCs in the near future. Discretionary budgets per student in LDC primary schools are as low as about \$5 per year (Grace and Kenny, 2001) – hardly enough to support a computer center.

Even if the human and physical capital barriers to Internet use can be overcome, however, it is doubtful that the utility of the Internet for the poor in LDCs will be as significant as it is for the wealthy of the world. First, the poor are less reliant on market transactions made more efficient by the Internet. In Tanzania, for example, 83.5 percent of the poorest are crop producers – much of that for subsistence. Of the poor's food expenditures, their largest budget item, 56 percent are in kind rather than cash (World Bank, 1996). Even when poor people do make market transactions, they do not have access to the financial infrastructure to make purchases on-line (credit cards or bank accounts), nor is the physical delivery infrastructure (roads, postal networks) in place to make direct business to consumer transactions a feasible option. Miller (2001) argues that these weaknesses account for the fact that only 2.2 percent of India's Internet subscribers have engaged in e-commerce activities.

All of these non-physical barriers to the Internet help to explain the low usage of Internet facilities even in poor areas lucky enough to have access. A recent survey of two villages in Uganda<sup>[1]</sup> at the time Internet-enabled telecentres were set up in the villages, suggests usage rates at below 5 percent (compared to close to 30 and 100 percent for telephone and radio usage respectively).

The barriers (both physical, human and institutional) to widespread Internet access amongst the poorest in LDCs are significant, then. At the same time, the utility of access is likely to be lower amongst the poor. All of this suggests that a program of bringing direct Internet access to the world's poorest people might have a low development impact. It might be a mistake to bridge this particular "digital divide".

## The digital divide between global enterprises

Turning back to business use of the Internet, I have suggested that many LDC businesses might not be able to afford to be left behind, unable to undertake global e-commerce transactions. Nonetheless, the evidence here is even stronger that the "digital divide" issue to be addressed is not one of access, but of use. Indeed, the access gap is comparatively small between firms in LDCs and those in the West – much smaller than cross-country income gaps, or national figures on the "digital divide." For example, in 1999, approximately 21 percent of the population of high income countries used the Internet, as compared to 2.2 percent in Eastern Europe and Central Asia (ECA). As to Internet access in companies, that averaged around 60 percent in the G-7 countries, as compared to an average of 33 percent amongst firms surveyed in the Eastern Europe and Central Asia region. In other words, the ECA-G-7 access gap for individuals is a factor of about ten, compared to an access gap of less than twofold for companies[2]. Figures for Tanzania are even more stark. About 0.1 percent of the general population had access to the Internet in 1999, compared to 16 percent of enterprises – the Tanzania-G-7 access gap for individuals is a factor of over 200, compared to an access gap of less than fourfold for companies (calculated from Pigato (2000) and World Bank (2001)).

At the same time, and as with popular use of the Internet, actual usage rates of ICT in LDC companies is much lower than in the developed world. A survey of Tanzanian firms (Pigato, 2000) found that amongst the 30 percent of firms that had access to the Internet, less than half used it frequently and only 13 percent rated it as an effective product promotion tool.

This suggests, once again, that the "digital divide" is not primarily a physical access divide, but one related to skills, lack of relevant applications, or the broader economic environment. Looking at Botswana and Tanzania, Pigato (2000) concludes that weaknesses across all types of infrastructure, combined with a low skills base and few relevant applications, deter usage in enterprises. Clarke's (2001) study of Internet usage in firms in Eastern Europe suggests a broader set of issues in his finding that, beyond income per capita, urbanization and telephone infrastructure, opening up to FDI is the factor that can have the most dramatic effect on firm Internet usage.

### Conclusion

Access to information is vital for the poor and enterprises in LDCs as much as it is in developed countries. The divide in terms of information access is undoubtedly a cause as well as an effect of lower incomes in developed countries. Communications technologies including the Internet are undoubtedly an important part of the solution to this information gap.

Having said that, the poor in LDCs face many "divides". The education divide, the healthcare divide, the automobile divide. That the poor have less of goods traded in a market should come as no surprise – after all, that is what being poor means. The relevant question for the poorest is, does the lack of access to a particular good provide a significant barrier to becoming more wealthy. I would argue that the answer to this question is "yes" for tools of communication in general, but likely to be "no" for the Internet in particular.

We have seen that the Internet is, at present, likely to prove an unsuitable technology for poor people in LDCs. It is an expensive technology to provide, and one which requires language, literacy and technical skills to utilize that are absent amongst the majority of the poor. Further, a range of infrastructural and institutional barriers (such as limited credit facilities) combined with the nature of economic activities amongst the poorest suggest that the benefits of Internet access might be comparatively low even if problems of human and physical communications capital shortages were overcome.

Other communications technologies, already more widespread, with less demanding capital and educational requirements, are likely to be more suitable for exploitation. We have seen that there is a range of evidence linking telephony with improved quality of life in developing countries – and that the technology faces far lower barriers in terms of education and language. Although we have also seen that providing access to telephony alone is expensive in sparsely populated rural areas, it is far more straightforward than providing access to the Internet as well. The goal of universal access to the telephone is likely to provide a similar level of benefit to Internet access at much lower cost, then. Radio, a technology that has already achieved near-universal access in LDCs, is another technology that can be exploited to provide information and educational material to poor rural populations. There is already compelling evidence that interactive radio instruction is a cost effective and sustainable technology for distance education, for example – and a communications tool affordable even in the poorest countries (Kenny, 2002b).

Turning to the "digital divide" between enterprises in LDCs and high income countries, the case for the necessity of Internet use is somewhat more compelling. Enterprises involved in international trade in particular might well need to use the Internet if they are not to lose out to Internet-enabled competitors. But for businesses in LDCs, the "corporate digital divide" is again one of use, not access.

Corporate use is limited by a number of factors. For all of the reasons suggested above, it is doubtful that the Internet will become a powerful tool for reaching the average domestic consumer in the near term. Because of weaknesses in infrastructure and institutions, the Internet has lower utility for LDC businesses just as it does for LDC

consumers. It is also the case that there are fewer on-line applications relevant to LDC businesses than those in more developed Internet markets. To some extent this is the result of the network features of the Internet creating a "low-user trap". The Internet becomes a more useful tool as more businesses use it. In the absence of a user base of businesses, it becomes unprofitable to develop Internet applications that would make more businesses use the World Wide Web. This does suggest a potential role for government, returned to below. But the results of business surveys cited above suggest that the most powerful incentive for improving Internet use amongst businesses would be to improve the broader economic environment – infrastructure, institutions, policies. To a large extent, the corporate digital divide is likely to shrink without direct intervention if governments follow policies that support an improvement in the broader business climate.

Having said that, two "no regrets" policies are likely to improve access and use both amongst individuals and enterprises in developing countries. First, reform of the basic telecommunications sector not only improves access to telephony, but also increases Internet use (see Dasgupta *et al.*, 2001; Clarke, 2001). Second, the Internet also has a number of uses in improving government operations, especially in the area of tax and budget management. Governments that use the Internet to improve the efficiency of internal functioning can provide a critical mass of Internet applications to encourage more widespread Internet use in the business community. For example, Chile has developed an extensive system of government online. One feature is the ability to pay corporate taxes electronically. Already, a large percentage of enterprises in Chile pay their taxes online.

Governments should also ensure that the legal environment is in place to support electronic commerce – digital signature laws, rules on the tax treatment of electronic transactions and consumer protection provisions. Finally, there is likely to be a role for public-private ventures in support of technical training.

Only this last pro-Internet policy of support for training should involve significant government expenditure beyond that justified by the positive fiscal impact of government service modernization programs. We have also seen the potential value of government-supported pro-poor access programs to more basic communications technologies – telephony and radio information. But even adding these to the total, expenditures on improving information infrastructure should be small. Enterprises are in a better position to decide their communications needs than governments, and the poor have a range of other priorities.

Speaking at a recent meeting of the IT great and good on the topic of the global digital divide, Bill Gates, president of Microsoft, argued that "there are things those people need at

[a dollar a day] other than technology . . . About 99 percent of the benefits of having [a PC] come when you've provided reasonable health and literacy to the person who's going to sit down and use it." Although he spoke as a voice in the wilderness, there is much evidence to support him. Overcoming the "digital divide" in terms of public access to the Internet should probably not be a priority of governments or development agencies. ■

#### Notes

- 1 For the IDRC, see [www.idrc.ca/telecentre/evaluation/nn/22\\_Buw.html](http://www.idrc.ca/telecentre/evaluation/nn/22_Buw.html)
- 2 These figures are calculated from data in Clarke (2001), who gives results for Internet access in enterprises in the ECA region, the World Bank (2001), which gives figures on Internet users and population for ECA and high income countries, and the UK Department for Trade and Industry (2000) which gives data on Internet access in enterprises in the G-7. The figure for enterprise access in the G-7 is an unweighted average of access data at the country level.

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