ICT: Promises, Opportunities and Dangers for the Rural Future

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Abstract

This paper briefly reviews the evidence regarding the rapid rollout of rural ICT access worldwide, and the powerful tools that access can unleash. At the same time, it suggests the limits to the ICT revolution in rural areas especially in poor countries, and points to the limited evidence that ICT will reverse forces of agglomeration favouring the concentration of people and productivity in urban areas. It concludes by suggesting the marginal role for ICT-based policymaking in regional development strategies.

Keywords

Regional development, Information and Communication Technology

[1] This paper is based in considerable part on material in my book *Overselling the Web? Development and the Internet* Boulder: Lynne Rienner.

1. Introduction: Digital Idyll?

The last decade has seen a number of exciting changes in access to and use of information and communication technologies in rural areas. And not just in the comparatively wealthy countrysides of Western Europe or North America –even rural areas with some of the lowest levels of income in the World, from Kerala in India to Lindi in Tanzania, have seen an explosion in access to communications technologies, and these technologies are proving increasingly powerful as new applications spread. It is no exaggeration to say that this extended access has made a real difference to the quality of life of billions worldwide, including perhaps more than a billion people in rural areas.

It is no surprise that this 'ICT revolution' has proven a powerful source for creative vision by utopian thinkers the world over. Not least, Tom Friedman's best-selling works suggested that ICT has shrunk the world "from a size medium to a size small," offering new opportunities to poor people and regions to compete. He suggested that the Internet, along with globalization "are acting like nutcrackers to open societies," so that the Middle East is on the edge of a democratic revolution –and so on. Internet visionary George Gilder went as far as to suggest that the Internet presages "the overthrow of matter… that will make the new millennium a time of awakening to the oceanic grandeur and goodness of the universe" (see Kenny, 2006, for sources).

A subset of the millenarian literature surrounding ICT focused on the concept of the digital idyll. The death of distance would free rural people from isolation, providing better access to goods and services. It would allow villagers to work in fields as diverse as punditry, accounting, and film-making without leaving their homes for the city. After decades of failure in regional development efforts, the ICT revolution finally provided the tools to reverse the flow of people and productivity from the countryside to the town.

Such thinking already looks a little naïve. We are past the heady days of the dot-com boom, past the hopes for imminent democratic revolution in the Middle East or past even dreams of a bug-free version of Windows. Awakening to the oceanic grandeur and goodness of the universe, while brought a good step closer by Google Sky, still appears to take more than a broadband connection. We will see that the ICT revolution does not presage an end to the pressures that have driven the movement of people and productivity to urban areas, either. The 'ICT Revolution' has had an impact of the quality of life for rural people worldwide, and will have a larger impact in the future. But no-one should wait for the networked arcadia.

This paper briefly reviews the evidence regarding the rapid rollout of rural ICT access worldwide, and the powerful tools that access can unleash. At the same time, it suggests the limits to the ICT revolution in rural areas especially in poor countries, and points to the limited evidence that ICT will reverse forces of agglomeration favouring the concentration of people and productivity in urban areas. It concludes by suggesting the marginal role for ICT-based policymaking in regional development strategies.

2. The Good News: Wider Access

The reach of information and communications technologies around the world has been expanding for decades. There is one television set for each four people on the planet (World Bank, 2005). In India, over 112 million households have a TV. As early as 1995, television exposure in China was estimated at one billion people (Jensen and Oster, 2006). The reach of radio is probably even greater.

But the recent past has seen particularly rapid rollout of access to telephones and the Internet, as technology advance has driven down costs. Fixed phone connection and rental charges have more than halved worldwide over the past decade. Meanwhile, mobile handset costs have dropped to as low as $50 and companies in LDCs claim that they can profitably provide service at an average revenues per user of just $60 a year. As a result, the proportion of households worldwide that had a fixed telephone almost certainly surpassed 50 percent in 2003. And even more rapid growth in access has been driven by mobile telephony. The number of mobile subscribers worldwide increased from 11 million in 1990 to 1.7 billion in 2004.

This access has extended to people previously far from any phone. In Burkina Faso, for example, there were fewer than 7,000 telephones outside the capital city in 1990, serving a population of 8.3 million people spread across an area of over 100,000 square miles. There was no mobile phone service. In 2002, the mobile footprint (the area of the country where a mobile phone signal is available) covered 5.4 million people outside of the capital—far more than half of the population living outside of Ouagadougou.

More widely, perhaps 83 percent of rural people in South Asia had access to a telephone in their village in 2002. In Africa, a 2001 survey of Ghana, Uganda and Botswana found that, even in rural areas, between 75 and 80 percent of respondents had made a phone call in the last three months. Across the globe, an estimated 86 percent of the World's population, including a considerable majority of rural populations, were under the mobile footprint in 2004 –and it appears quite likely that total telecoms access rates are even higher than that (Keremane and Kenny, 2006).

While the recent spread of the Internet has been somewhat less dramatic than that of the telephone, its speed would be unprecedented for a communications technology were it not for mobiles. Both Internet and mobiles reached ten percent of the world's population within fifteen years of invention, and there are already far more Internet users in the developing world than in the developed. The number of users tripled over the 2001-2005 period in the developing world, reaching over 440 million (UNCTAD, 2006). Of course, rural areas in developing countries in particular do still see very low Internet usage. A few years ago, but ten percent of Thailand's Internet users were rural, despite the fact that rural people made up nearly 70 percent of the country's population (Kenny, 2006). Many rural areas of even comparatively rich developing countries still see Internet usage rates at below one percent of the population. Nonetheless, the *opportunity* to use the Internet has spread far and wide, even if usage itself has not.

3. The Better News: More Uses

Again, there is a long record of ICT use having an impact on development outcomes in rural areas. Over 700,000 secondary-school students in remote villages in Mexico watch the *Telesecundaria* program of televised classes. While students enter the program with lower mathematics and language test scores than the average, by graduation they have caught up in math and halved the language-score deficit (de Moura et al, 1999). Survey evidence from within developing countries has long suggested that rural areas with access to telephones see lower prices for inputs, higher prices for outputs, larger non-farm incomes, a greater number of small and medium enterprises and better delivery of public services (Forestier et al., 2002).

As technologies have spread, so have their impact. Robert Jensen and Emily Oster of the National Bureau of Economic Research study the rollout of cable television access in rural India and conclude that the introduction of cable in a village is associated with higher female school enrollment, declines in fertility and increased female autonomy (Jensen and Oster, 2007). The size of these effects is large: within two years of introduction, between 45 and 70 percent of the difference between urban and rural areas on these measures disappears, and the impact of cable TV on fertility decisions is as large as increasing the length of time girls stay in school by around five years.

Regarding the spread of mobile technologies, Grameen Phone has leased cell phones to poor rural women who set up local village pay phone shops. In a review of the early experience of the Grameen Phone project, this service was found to be of considerable benefit both to the provider and the users. Not least, the average operator was earning between 24 and 40 per cent of household income from providing phone services and the estimated consumer surplus from phone usage ranged as high as $2.70-$10 per call (Richardson et al. 2000).

This consumer surplus derives in part from the significant power of communications to improve market outcomes. In Kerala in India, mobile phone service was introduced over the period 1997-2001. One result was a dramatic improvement in the efficiency and profitability of the fishing industry. As mobile phone service spread, it allowed fishermen to land their catches where there were wholesalers ready to purchase them. This reduced waste from between 5-8 per cent of total catch to close to zero and increased average profitability by around 8 per cent. At the same time, consumer prices fell by 4 per cent (Jensen, 2007).

Many of Kerala's fishermen are using text messaging –as are fishermen on Lake Victoria in Africa who use SMS as a cheap way to get information on landing prices for fish before arriving at a particular market. More advanced uses are also spreading in the developing world - the Philippines already has over 3.5 million m-commerce users, and banking over mobile phones is available in South Africa and Kenya (infoDev, 2006).

Even the Internet has proven valuable in developing country rural areas. ITC, a major Indian agri-business conglomerate, used the internet to re-engineer their supply chain. With its Internet-based e-Choupal system used to automate soybean purchases from, and input sales to, small farmers, it is estimated that ITC saves roughly US$ 5 on each transaction, and the farmer saves a similar amount (Kumar 2004).

4. The Bad News: Agglomeration in Production and Advanced Use

While the spread of ICTs has been dramatic even in rural areas and while a number of uses have sprung up even for advanced ICTs, there are distinct limits to the transformative power of the Internet in particular to overcome the underlying disadvantages that hamper rural areas in developing countries.

One illustration of the barriers faced by the Internet is the LINCOS project. In 2001, a cooperative venture between MIT, Microsoft, Alcatel and the Costa Rican government set out to show that a rural telecenter project could make a difference to the quality of life of the rural poor. Little intelligent communities (or LINCOS for short) would provide the poor with access to telemedicine, distance education and a range of other services. The venture created a rural center that did not require access to telephone lines or the electricity grid (utilizing solar and satellite technologies) at an investment cost of only $20,000 per computer (although it should be noted that this is approximately equal to the total annual income of 55 people living on a dollar a day) (Shakeel, Best, Miller and Webber, 2001).

Two years later, the project abandoned its rural base for the town of San Marcos, because the intended beneficiaries stayed away. Not that the project was an all-round failure –local coffee farmers, some of the richest people near the village of El Rodeo where the center was based, used the center to check coffee prices and register trade marks.[2] It appears that the Internet is far from irrelevant to some people in rural areas of developing countries, but not everyone sees the need –perhaps has the need—to access it.

All sorts of other creative but expensive ways to get the Internet to far flung places have been tried in LDCs. The Navegar project in Brazil has eight desktop computers, a GPS system, a digital camera, a scanner, an ink-jet printer, two Web cams and a satellite dish inside a three-floor, wooden boat. The boat travels around the eight-island archipelago of Bailique, serving about 8,500 people in 38 communities.[3] In Malaysia, they have put the Internet on a 40-foot bus which has served 2,800 children over two years in rural areas around the city of Tunjang. The bus is valued at $263,000. Capital costs per student successfully taught how to use e-mail run at perhaps $230.[4]

Again, it is worth comparing these figures to potential communications expenditures amongst poor people in the rural areas of 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. That means the Malaysian Internet bus costs the equivalent of 26,000 years of communications expenditure by a poor person. One thousand people living on a dollar a day, spending all of their communications budget on the Internet, would be

[2] The Christian Science Monitor *Internet Project for Poor Attracts Rich* 07/24/03.

[3] http://www.wired.com/news/wireless/0,1382,45919,00.html.

[4] New York Times 08/23/01.

required to support each Internet-enabled computer in a setup like LINCOS. 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 10 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 1 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.

Of course, this gap could be bridged with considerable subsidies of rural Internet access –an approach tried in any number of countries including the cases discussed above. But it has to be asked if such subsidies –which will be large-- are the most sensible use of scarce government resources for rural development projects. The LINCOS project failed despite considerable subsidy because of lack of interest on the part of intended beneficiaries. This highlights the fact that 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 rural poor.

The average person living on a dollar a day (most of whom are rural) is illiterate (Kenny, 2002). The Internet has the power to convey sound and video, but that power is much diminished in an environment of slow connections and frequent line-drops. Furthermore, much Internet content remains textual. Given that, illiteracy poses a major barrier to Internet use. 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, as we have seen –hardly enough to support a computer center (Grace and Kenny, 2003).

The majority of those living on a dollar a day also speak a minority language in their own country. Even fewer speak English, in 2001 the language of 72 percent of the world's websites (Kenny, 2002). Many of the languages of the rural 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 in 2002, 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. By 2006, there were additional sites on learning the language, but still under fifty sites in Igbo for Igbo speakers. There are no sites offering an automatic page translation service from English to Igbo, and so an Igbo speaker would be limited to these few pages on the web. It might be questionable if access to these five documents is worth $10,000 per enabled computer per year.

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 rural poor in LDCs will be as significant as it is for the wealthy of the world. First, the rural poor are less reliant on market transactions made (somewhat) more efficient by the Internet. In Tanzania, for example, 83.5 percent of the poorest are crop producers –much of that for subsistence. 56 percent of this group's food expenditures, their largest budget item, 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. These weaknesses account for the fact that only 2.2 percent of India's Internet subscribers had engaged in e-commerce activities at the turn of the century (Miller, 2001).

All of these barriers might help to explain rural preference for other communications technologies than the Internet. A survey involving villages in Gujarat (India), Mozambique and Tanzania all located near towns with Internet access found very limited use indeed. "It was hoped that this report would provide information about use of and attitudes towards the Internet" wrote the researchers. "In practice, however, in spite of the availability of Internet facilities in local towns, less than two percent of those surveyed had ever made any use of these." This compared to around 90 percent that had made use of a broadcast technology and between around 70 percent who used a telephone at least five times a year (Souter et. Al., 2005). In turn, low demand and high cost might help to account for the fact that a survey by the United Nations Development Program could find no examples of donor-funded telecentres that were fully sustainable (UNDP Evaluation Office, 2001).

The situation is somewhat different amongst the majority of rural businesses, where email is seen as a valuable tool, but even with such businesses the World Wide Web appears an unnecessary luxury. A 2003 survey of Vietnam's small-scale handicrafts enterprises in the Red River Delta found that while 100 per cent of enterprises had a phone and 75 per cent had e-mail access, only 25 per cent had a web site (Konstadakopulos, 2006). Furthermore, many of these websites were not accessible and those that could be accessed were of basic design and poor content. None offered e-commerce facilities. Again, a survey of 74 garment and horticulture firms in Kenya, South Africa and Bangladesh found that 95 per cent were using e-mail for business, but only 44 per cent had a website and 7 per cent had made a sale via an e-marketplace (Humphrey et al., 2003). Similar results emerge from surveys in Brazil, Chile, China, Malaysia, Mexico and South Africa (Molla, 2005).

If it appears that subsidising Internet *access* in rural areas may be costly and of limited benefit, what about ICT-enabled *industries* in rural areas –call centers, software services and so on? Here, the evidence is that production of ICT goods and services naturally clusters in urban areas such as Silicon Valley and Bangalore. Looking at the US as a whole, industry data suggests that the rate of convergence across regions in terms of employment in IT-intensive industries occurs at one half of the rate for all industries. In other words, areas that had more IT employees in 1990 remain areas with more IT employees today. This suggests clustering at work.

Furthermore, government subsidy to ICT firms is not a way to attract considerable industry at little cost, perhaps particularly in the case of rural areas. One reason for this is that 'clustering' may have less to do with the presence of other ICT firms and more to do with the fact that all ICT firms are attracted to similar locations. The US study that found evidence of clustering, for example, suggested that it occurred because IT-intensive industries tend to rely on (unequally distributed) high-skilled labor. IT-intensive industries that do not rely on high-skilled labor see faster convergence –suggesting smaller clustering effects (Kolko, 2002). This suggests that ICT firms are not attracted to Silicon Valley because there are other ICT firms as much as because there is a large pool of labor with ICT skills, strong local universities with ICT programs, sources of venture capital, a climate that allows for innovation and attracts innovative people and so on.

Related to this, short-term government policies covering subsidies to ICT firms are only a very small part of the picture looked at by companies choosing to invest in a new venture, then. Malaysia's multimedia supercorridor is a particularly powerful case study here. The $10 billion-plus investment by the government was matched by just $475 million of private investment and 7,300 jobs (that works out at more than $1 million per job) up until 2000. Reasons that companies cited for not moving to the corridor included concerns about government monitoring of Internet traffic, capital controls, red tape, slow visa approval, weak intellectual property rights and the absence of an appropriate skills base.[5]

Added to the limited power of subsidies to attract industry is their high cost –and this applies in particular to efforts to attract such industries to rural locations. Looking at call centers, in the Highlands and Islands of Scotland incentives have included subsidies to telecommunications service providers (this alone at a cost of over $2,000 per job created) and construction of low-rent facilities in government-owned business parks (Richardson and Gillespie, 2003). Many successful call centers even in urban areas of developing countries also appear to have garnered such support –Dakash India, which has 3,600 call center employees in New Delhi and Mumbai, operates under a regime of tax breaks and financial support that includes exemption from income taxes (UNCTAD, 2003).

To date, the benefits of these subsidies and tax breaks in India has accrued to the lucky few. We have seen that clusters are likely to form where there are concentrations of highly educated people, venture capital, and other factors of success –and so this is where the tax breaks have ended up, as well. Meanwhile, the spillover effects of clusters on poor communities are unclear –poor people do not produce much needed by ICT firms, and they are not major consumers of software. As Nobel-prizewinning economist Amartya Sen notes of Bangalore's software export industry: "even 100 Bangalores would not solve India's poverty and deep-seated inequality. For this to happen many more people must participate in growth. This will be difficult to achieve across the barriers of illiteracy, ill health and inequalities in social and economic opportunities."

One recent study estimates that the overall impact of productivity gains thanks to the ICT-producing sector of India was to add 0.05 percentage points of GDP growth to the Indian economy between 1995-99 (Qiang et al. 2003) –this in the developing country with the largest ICT-enabled export industry. The effect in rural areas will be even smaller than this number suggests because of the concentration of the industry –and subsidies, and tax breaks—in urban areas. This suggests scant evidence of ICT industries –or rural development policies centred around ICTs-- providing the tools for rural rebirth in developing countries.

5. Conclusion: Don't Wait for a Networked Arcadia

Information and communications technologies have already had a significant impact on the lives of rural people worldwide. The radio, television and telephony are increasingly

[5] Dedrick, J and K. Kraemer (2000), Business Asia 10/2/2000, Far Eastern Economic Review 3/16/2000.

ubiquitous even in poor and remote areas of low-income countries. This has reduced isolation, improved access to services and made markets work better for poor and rich alike. At the same time, given the greater utility of advanced ICT use to those who are literate, who speak a global language, and who have access to physical and financial infrastructure, the Internet is likely to be, if anything, a source of further divergence in incomes and opportunities between poor and rich, rural and urban.

The response should not be a strategy to bring advanced ICTs or ICT-enabled industries to rural areas –precisely because limited utility and a lack of comparative advantage suggests low benefits to what would be very costly endeavours. There may be a role to support the rollout of telephony and broadcast technologies countrywide, because these are services in demand by poor people in rural areas, and because costs of rollout are far lower. But it appears that the role for ICTs and, in particular, rural development strategies based around ICTs, is comparatively limited. A networked arcadia is some way off.

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