STANFORD
GRADUATE SCHOOL OF BUSINESS
STANFORD SOCIAL INNOVATION *review*

Dialing for Development

By David Lehr

Stanford Social Innovation Review
Fall 2008

Dialing for Development

By David Lehr | Photograph by Deshakalyan Chowdhury, AFP/Getty

The world's neediest people are using mobile phones in ways that were never intended, and with great success. With wireless technologies, Indian farmers are finding out the latest crop prices, Nigerian youth are learning how to prevent the spread of HIV/AIDS, and Peruvian citizens are reporting criminal activity in their neighborhoods. Yet dialing into these powerful tools is not always straightforward. The author explains how to make the wireless revolution ring in economic growth and prosperity for people living at the bottom of the pyramid.

There are 2.6 billion people around the world who live on less than $2 per day.[1] Most of these people living at the bottom of the pyramid lack clean water, healthy food, and affordable health care. Long recognizing these problems, foundations, nonprofits, and governments have spent billions of dollars trying to alleviate them. More recently, microfinance institutions have recognized that poor people lack the capital and financial services that are necessary for economic growth and job creation. And so these organizations have started offering these services to the world's poorest people, unlocking new economic opportunities for borrowers and lenders.

Yet until recently, most organizations have overlooked another important need in poor communities: the need for information and communication services. At first glance, this need doesn't seem as great as that for clean water, or even for capital. But in the 21st century—the Information Age—lacking access to information can be just as debilitating as lacking health care or housing. For example, poor fishermen who don't know the market price of fish are at the mercy of unscrupulous middlemen. Rural farmers who don't know the weather forecast or the most recent pricing trends don't know what to plant, when to harvest, or how much they can expect to earn. And health workers who don't know about a recent disease outbreak cannot protect their patients. In these far-flung, sometimes isolated areas, accurate and timely information can save a day's travel time, a month's wages, or a year's vegetable crop.

A remedy for this information shortage has arrived: the mobile phone. Portable, small, and relatively inexpensive, mobile phones have leapfrogged past landline technologies in many parts of the world, where it is cheaper to build new wireless networks than it is to construct new landlines. These wireless networks deliver almost as much information, features, and services as basic landline networks, and in some cases they actually deliver more.

Mobile phones and commodity information services help mango farmers and traders, such as this man in his stall in Kolkata, India, earn more money.

Accordingly, sales of mobile phones are booming in poor countries: In 2008, consumers are expected to buy more than 1.25 billion mobile handsets, with a stunning 70 percent of those sales occurring outside of Europe and North America, according to *Wireless Mobile News*. India added 68 million mobile phone subscribers in 2007, and Africa added another 64 million. Indeed, nowhere has the story of mobile telephony been more dramatic than in Africa. Mobile phone subscriptions there have risen from just two per 100 people in 2000 to 33 per 100 people today, for a total of 250 million subscribers. Subscribers are also now more evenly distributed: In 2000, more than half of all of Africa's mobile phone subscribers were in South Africa, but by 2007 only 15 percent were located there, according to a 2008 International Telecommunication Union report.

Meanwhile, a growing number of nonprofits, businesses, and government agencies are developing new mobile phone-based information services for poor people. These services are of five distinct types: spreading access, opening markets, delivering information, collecting data, and facilitating finance. To capitalize on each of these new mobile phone applications, however, organizations must make sure they are meeting the unique needs of poor users.

MEETING USERS' NEEDS

To serve the bottom of the pyramid, mobile phone companies have to adjust for the unique circumstances that resource-poor people and places present. First and foremost, they have to adapt their services to local languages and cultures. In India, for example, more than 100 different languages are spoken. This diversity makes it difficult for people to communicate with others outside of their region and presents a particular challenge to organizations that provide information services, especially ones that send and receive text messages.

These language barriers are made all the more difficult when people are illiterate, as many of the world's poor are. Since the typical mobile phone interface relies on numbers and letters, some literacy is required to use it. Icon keys are good for dialing—most people know that the green key is used to initiate a call and the red key to end it—but it is not practical to dedicate an icon key to each of the phone's many functions. Illiterate users can, and do, send text messages by enlisting the help of a literate family member or friend. Interactive voice-recognition systems can also help illiterate users make use of the phone's features and the information services that organizations provide over the phone.

People living in poor countries often need time-consuming and expensive education before buying and using new mobile products and services. Wizzit, a South African mobile banking company, overcomes this hurdle by marketing its services through a network of more than 2,000 WizzKids—young people hired and trained to serve as independent agents of the company—who educate people about mobile banking and help them open accounts. About 80 percent of Wizzit's customers previously had no bank account.

In addition, many poor people, particularly those living in rural villages, still prefer to rely on their trusted network of family, friends, and relatives—rather than a technology device—to get their information. In some places husbands even ban their wives from owning phones, according to Ken Banks, the founder of Kiwanja.net, a U.K. nonprofit that develops mobile phone-based services for the poor.

Organizations must also find ways to make mobile phone services and products affordable. Prepaid service and calling cards have been critical to the mobile phone's success in poor countries. More than 90 percent of mobile subscribers in Africa use prepaid mobile phone services, according to Vanessa Gray, an analyst with the International Telecommunication Union. Prepaid cards are attractive to the poor because they can pay for the service as they need it, helping them conserve cash. Prepaid cards also provide a way for those who would be denied a mobile phone subscription—because they have no credit, bank account, or fixed address—to purchase airtime.

To make the cell phones themselves more affordable, mobile phone companies have developed low-cost handsets that strike a balance between price and functionality. The GSMA Emerging Market Handset program, for example, was created to design a mobile phone for the developing world that costs less than $30.

SPREADING ACCESS

Many companies, nonprofits, and government agencies not only have adapted their services and products to the bottom of the pyramid, but also have created new services and products to improve the economic standing of the world's poorest people. One of these innovations is shared-access telephony, whereby one person or organization owns the mobile phone subscription and rents airtime to others.

The shared-access model started with landline services in India and other countries. Local shopkeepers would operate small telephone booths, spreading the total costs of a phone over multiple users. With the growth of mobile networks, entrepreneurs began purchasing mobile phones and renting airtime to poor consumers. Entrepreneurs earn money by charging more than they pay for the airtime. Poor customers, in turn, benefit from having low-cost access to a phone.

Grameenphone has turned the shared-access model into turnkey businesses for poor entrepreneurs. Started by former New York venture capitalist Iqbal Quadir in partnership with the Grameen Bank, Grameenphone, with more than 20 million subscribers, is the largest mobile phone company in Bangladesh. Through its Village Phone program, Grameenphone makes microloans to poor entrepreneurs so that they can buy a mobile phone, an external antenna (for better coverage), and a discounted subscription. The microentrepreneurs then pay off their loan and, eventually, turn a profit by renting their phone to others. Village Phone not only boosts these people's incomes, but also elevates their social status within their communities.[2] More than 220,000 village phone operators—mostly women—now work in Bangladesh, according to the Grameen Foundation.

Grameenphone also offers shared Internet access services that use mobile phone networks. A second turnkey business, called the Community Information Center, helps microentrepreneurs buy computers and other equipment required to access the Internet.

David Lehr is senior advisor for social innovations at Mercy Corps. He recently returned from India, where he spent a year as an Acumen Fund Fellow advising Drishtee, a nonprofit that assists Indian entrepreneurs. Lehr spent many years working for Silicon Valley companies, among them Adobe Systems Inc., where he launched the company's China operations.

A member of a local savings and lending self-help group in the Indian state of Tamil Nadu uses a mobile device to make a financial transaction.

PHOTOGRAPH COURTESY OF EKGAON TECHNOLOGIES

Villagers then pay between 15 and 35 taka (roughly 22 to 50 cents) to use the Internet. There are now more than 500 Community Information Centers in Bangladesh.

The shared-access model, however, may no longer be viable in some areas. Because of falling service prices, increased competition among operators, and improvements in mobile phone coverage, village phone operators in Uganda, for example, are seeing their profits fall. The shared-access model is also less attractive in countries such as India and China, where rates and equipment prices are already among the lowest in the world.

OPENING MARKETS

Despite their lack of resources, poor people are constantly selling and buying labor, agricultural products, handiwork, and other goods and services. Because poor people don't have good information about market prices, however, they are often at a disadvantage. Farmers are particularly vulnerable to exploitation by well-informed middlemen who offer below-market prices for produce. Moreover, farmers often do not have enough information to take advantage of price changes in international markets.

Mobile phones help level the market by giving poor people immediate access to accurate and timely information via text messages. To provide these services, Thomson Reuters, one of the world's largest providers of business information, developed Reuters Market Light (RML). Launched in the Indian state of Maharashtra in late 2007, RML delivers local agricultural prices, weather information, and agricultural advice to subscribers' cell phones three to five times a day. Almost 40,000 subscribers pay 175 rupees (roughly $4) every three months for this information.

It is still too early to know how well the program is working, but anecdotal evidence indicates that it is helping some subscribers make better decisions and earn more money. "We have examples where people have made as much as £3,500 (roughly $7,000) by getting the right information in time," says Amit Mehra, RML's managing director. "There's a customer who gets a message that it will rain, so he deploys less labor. Another got a message that the supply of onions will go down so he held back his crop and made a $350 profit in one month." [3]

Despite the success of the program, RML is facing a number of challenges. The cost of providing the service is high. That's because RML must gather data from about 45 of its own reporters covering 50 markets and 11 crops across Maharashtra. And many people who might want to use the service can't because they are illiterate. To overcome this barrier, many of the farmers get their sons or daughters to read the text messages to them. RML is considering a new service that would provide the same information using voice messages, in addition to text messages.

The Manobi Development Foundation, a nonprofit that develops mobile phone-based services for poor and underserved Africans, has created a similar service for ocean fishermen in Kayar, Senegal, and other Senegalese towns. When the fishermen leave shore to begin fishing, they use their cell phones to log their departure time and estimated time of return, so that local fishing associations can be alerted if fishing boats fail to return on time. The fishermen cast their nets during the night, sometimes as far as 25 miles out into the Atlantic Ocean, in long, open, canoe-like boats. "If we are one hour or two hours late returning, they can send an alert and try to help us," says fisherman Adama Diop.[4] The system can pinpoint the exact location of a vessel in distress and send an alert to the nearest boats to assist in a rescue. The same system also transmits safety information and weather alerts.

To help the fishermen make more money, Manobi collects fish prices at the ports twice a day, analyzes the information, and then distributes the results to the fishermen while they are still at sea. The fishermen can then go to the port or beach where they will get the best price for their catch. Fishermen using this system have increased their sales by 30 percent.

DELIVERING INFORMATION

Mobile phone networks are also an inexpensive and convenient way to deliver information that can improve poor people's health, well-being, and security. In Nigeria, for example, Learning About Living (LAL), a project managed by U.K.-based OneWorld, is using cell phones to help educate young people about reproductive health and sexual behavior. Nigerian cultural and religious traditions discourage the discussion of these topics, believing that it would only encourage risky behavior by young people. LAL, however, believes just the opposite—that access to this information is critical for slowing the high incidence of HIV/AIDS and deaths from unsafe abortions.

LAL operates a Web site that has a great deal of information for young people on personal and health issues. To reach young people who don't have access to a computer, LAL offers a more limited set of services over the cell phone. One of these is MyQuestion, a free service that allows young Nigerians to ask questions anonymously and receive answers about HIV/AIDS, relationships, and sexual health.

Kiwanja.net has developed a set of software tools called FrontlineSMS that is helping nonprofits rapidly implement their own text messaging services. The platform, first launched in 2005, is free to nonprofits. It allows them to send large numbers of text messages to mobile phones by simply using a computer with an attached mobile phone or modem. Recipients of the text messages can also reply. In Afghanistan, CARE International uses FrontlineSMS to keep its field staff informed of the security situation.

Efforts are under way by Bloodbank in Kenya and the Jeevan Blood Bank in India to use text messaging over cell phones to identify potential blood donors, send alerts to donors when blood supplies are low, and help manage blood supplies at local hospitals. Previously, these blood banks had to contact potential donors one by one, which required considerably more effort and extra manpower each time a blood drive occurred. With the new text messaging service, potential donors can be contacted more quickly and inexpensively. And because the reminder to donate can be kept in the phone's memory, details of the appointment time or directions are easily available.

COLLECTING DATA

Global businesses such as Hewlett-Packard Co. and Apple Inc. spend billions of dollars annually to collect the data they need to track inventory, manage supply chains, and collect sales information. Likewise, nonprofits and government organizations, from Mercy Corps to the Centers for Disease Control and Prevention, have to track enormous amounts of data to deliver their products and services. With the growing reach and cost effectiveness of mobile phones, collecting data from the field is becoming increasingly affordable to organizations serving the poor.

Voxiva Inc., a for-profit based in Washington, D.C., helps organizations use mobile phones to collect this type of information. Workers in the field can use text messaging, the phone, and the Internet to collect and submit data to a central location, where it is analyzed and the results are sent back to the field, creating a two-way information flow.

For example, citizens of Miraflores, Peru, use Voxiva's services to report crimes to the city's government. The government uses this information to track crime rates and better allocate police resources. Before the system was implemented, "80 percent of neighbors did not report crimes for fear or lack of confidence in authorities," said Fernando Andrade, former Miraflores mayor. "Today, that has changed." Citizens now file almost 50,000 reports a year, and the overall crime rate has declined 50 percent.

The police department uses the citizen-generated information in several ways. In urgent cases, dispatchers immediately send police officers to the scene to deal with the crime. In most instances, the information that citizens send in concerns crimes that have already occurred. This information, along with other data that the police collect on criminal activity, police response, and the outcome of cases, is aggregated and analyzed. The results are then used to identify high-crime areas and track criminal trends, and to help the police allocate their resources to prevent crimes from occurring.[5]

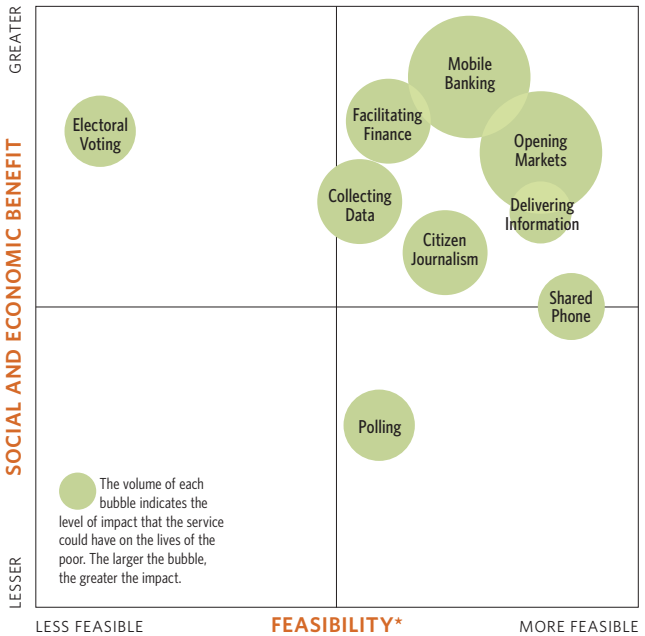
Voxiva systems have also been used to track diseases, monitor patients, manage HIV/AIDS programs, and respond to disasters. In the Indian state Tamil Nadu, for example, the system was used to prevent the outbreak of disease following the devastating tsunami of December 26, 2004. The initial death toll from the tsunami that struck Tamil Nadu was more than 10,000 people, but there were fears that an outbreak of disease could follow that would bring the death toll even higher.

In the months after the tsunami, Voxiva worked closely with Indian health officials to create a surveillance network that would easily access and analyze disease information in real time. This system used the Web and cell phones to link health professionals in rural areas of Tamil Nadu with government health officials. Using e-mail and text messaging, reports from the field on outbreaks of disease were sent to a central location, and alerts and information about disease trends were sent in reply.

The mobile phone is also an effective tool for polling citizens and monitoring elections. Companies such as Poll Everywhere and Crisp Wireless offer text messaging software that allows businesses to conduct market research, governments to collect census data, and nonprofits to assess the needs of their clients. For example, Kubatana.net,

Mobile Solutions for the Bottom of the Pyramid

Opportunities abound for social entrepreneurs who want to take advantage of mobile networks. But choosing the right applications requires careful evaluation. The figure below provides a practical framework for assessing the feasibility, benefits, and likely impact of existing and emerging mobile phone services.



*Feasibility represents an aggregate summary of the financial, technical, cultural, political, and regulatory constraints that are likely to affect a project.

an online community of Zimbabwean activists, conducted a poll using text messaging and e-mail to find out whether citizens supported the opposition party's decision to withdraw from the June 2008 election. Those responding to the poll supported the Movement for Democratic Change's withdrawal decision by about four to one.

Citizens are also using their mobile phones to monitor elections. In Nigeria's April 2007 presidential election, for example, a network of election monitors used text messaging to send their observations to a central location shared by the European Union and other monitoring groups. More than 10,000 text messages were sent in by election monitors. There were still widespread reports of ballot stuffing and other irregularities, but the mobile phone enabled ordinary citizens to tell the world what really happened on election day.

FACILITATING FINANCE

Mobile devices are also helping poor people gain access to financial services, often a critical component for enabling them to move out of poverty. Access to loans and savings services can help the poor establish their own small-scale enterprises and provide a safe place for them to deposit cash. The cost of providing these services to poor people in remote areas using traditional banking methods—such as opening branch offices or installing ATMs—is high relative to the small dollar value of a typical transaction. Cell phones, however, can be used to provide some of the same services at a lower cost.

Both Wizzit and Kenya's M-PESA, a money transfer and bank account service, allow customers to use their phones to get information about their bank accounts, make loan and bill payments, and transfer money between accounts. Vodafone, the world's largest mobile telecommunications company, estimates that by 2010 half of all South African bank accounts will be administered from cell phones.

Financial institutions that serve the poor are also using cell phone networks to reduce their operating costs. For example, Jamii Bora Trust Ltd., one of Kenya's fastest-growing microfinance organizations, has 74 branches, 140 outlets, and 170,000 clients spread throughout the country, many in remote rural areas. It was costly to create a conventional network to link all of these locations, so in 2006 Jamii Bora began experimenting with using a wireless network to interconnect its offices.

The experiment proved fruitful, and now Jamii Bora uses a wireless network to connect its branches and outlets to the company's central office in Nairobi. Customers log in to the system using a fingerprint scanner to authenticate their identity. Once customers are connected to Jamii Bora's Nairobi database, they can make loan repayments, receive disbursements, and conduct other business.

Although these wireless devices cost $1,000 each, this system has reduced the cost of providing banking to the poor and made it more convenient for customers. Management now has real-time information about accounts and can manage its cash and more easily expand. "Every loan officer and man on a bicycle is online with our central server in Nairobi," said Ingrid Munro, Jamii Bora's founder. "And at the end of each day, we know the cash position of each branch."

Mobile phones are also improving communication between microlenders and local self-help groups (groups of 20 or so people that help one another save and borrow money). Ekgaon Technologies, for example, has developed a mobile phone-based application that is used by more than 1,000 self-help groups in southern India. Members of the group record transactions on paper, and these forms are then photographed with the mobile phone's camera and uploaded to the microlender. The result is a system that facilitates a quick and accurate flow of financial data between self-help groups in small villages and and lenders in bigger cities.

PHONING THE FUTURE

Over the last decade, mobile phone technology has brought millions of the world's poor into the Information Age. And over the next decade, technological innovations in the developed world will continue to wend their way to the base of the pyramid, spurring even greater improvements in the lives of the poor. For example, mobile phones are quickly morphing into full-fledged computers that are capable of doing nearly everything a personal computer can do. Perhaps the best example is Apple's iPhone, which allows people to send e-mail, surf the Web, view documents, and make online purchases. As the cost of these devices comes down, the rural poor will be that much closer to having the power of the personal computer and accessing the vast information resources of the Internet.

Peripheral devices designed for the mobile world will also blur the line between the phone and the PC. Hewlett-Packard's gesture keyboard, developed by the company's scientists in India, makes it easier to use phonetic scripts such as Tamil and Devanagari. With the gesture keyboard the average person can learn to create 10 words per minute with just minimal training. Other technologies, such as mobile printers and thin folding screens, have a similar potential to add capabilities to the phone while decreasing the need for an actual PC. The expanding use of mobile phones that allow people to talk over the Internet will drive down the cost of voice services even more. And mapping and GPS tools will bring new services, particularly for disaster relief and data collection.

People living at the bottom of the pyramid are embracing the capabilities and the economics of the mobile telephone. The poor are not looking for hand-me-down technology from the developed world. They are demanding—and paying for—services that their more affluent counterparts have long enjoyed, and also requesting services that are especially tailored to their needs. With the prospect of 2.6 billion new consumers, now is the time to answer their call. ■

The author thanks Daniel Greenstadt, a partner at Thomas Associates, for his analysis and editorial assistance and for developing the figure, "Mobile Solutions for the Bottom of the Pyramid." The author is also grateful to the Acumen Fund for its generous assistance and support.

Notes

1 Kevin Watkins et al., "Human Development Report 2007/2008," United Nations Development Programme, 2007.

2 Nevin Cohen, "What Works: Grameen Telecom's Village Phones," World Resources Institute, June 2001.

3 *The Sunday Times*, March 30, 2008.

4 http://www.manobi.sn/sites/za/index.php?M=9&SM=18&Cle=6.

5 http://www.microsoft.com/industry/publicsector/partnersolutionmarketplace/CaseStudyDetail.aspx?casestudyid=200205.