

AFRICA CALLING

Can mobile phones make a miracle?

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Ten years ago the 170,000 residents of Zinder were barely connected to the 21st century. This mid-sized town in the eastern half of Niger had sporadic access to water and electricity, a handful of basic hotels, and very few landlines. The twelve-hour, 900 km drive to Niamey, the capital of Niger, was a communications blackout, with the exception of the few *cabines téléphoniques* along the way.

Then, in 2003 a Celtel mobile-phone tower appeared in town, and life rapidly changed. “I can get information quickly and without moving,” a wholesaler in the local market told me. Before the tower was built, he had to travel several hours to the nearest markets via a communal taxi to buy millet or meet potential customers, and he never knew whether the person he wanted to see would be there. Now he uses his mobile phone to find the best price, communicate with buyers, and place orders.

Zinder, which has since grown to some 200,000 residents, still has no ATMs or supermarkets, and many roads to surrounding villages are made of sand or compressed dirt. But it is filled with small kiosks freshly painted in the colors of the prepaid mobile phone cards they sell.

Despite anemic economic growth rates, limited agricultural progress, and overwhelming poverty (85 percent of the population lives on less than \$2 per day), Nigeriens are now more connected than ever. More than 60 percent of them have mobile phone services—no small feat in a country three times the size of California, with bad roads, unreliable postal services, and two landlines per thousand people.

Niger’s telecommunications revolution is being repeated all over Africa, where people are using mobile phones at rates that far exceed the industry’s early expectations. In 1999 the Kenya-based service provider Safaricom projected that the mobile phone market in Kenya would reach three million subscribers by 2020. Safaricom currently has over thirteen million.

And mobile phone use is booming despite high costs. The cheapest mobile phone in Kenya costs half the average monthly income. In Niger the price of the cheapest mobile phone could buy 12.5 kg of millet, enough to feed a household of five for five days. Yet mobile phone subscriptions in Africa have risen from 16 million in 2000 to 376 million in 2008—or one-third of sub-Saharan Africa’s population. This does not mean that 376 million people have mobile phones in sub-Saharan Africa—some people may own several handsets or subscriber identity module (SIM) cards, suggesting that official figures might overestimate the number of



A young girl uses a mobile phone at a market in Ghana.

actual users. On the other hand, sharing mobile phones is a common practice in Africa, so usership could be even higher than subscriber totals suggest. There is, in either case, no question that Africans are using mobile phones in high numbers.

As the numbers have grown, the demographics have also changed dramatically. Between 2005 and 2009, the percentage of the Kenyan population living in areas with mobile phone coverage remained largely constant, but the number of subscriptions tripled, reaching 17 million by 2009. The first adopters were primarily male, educated, young, wealthy, and urban. But with prices dropping, usage has extended to a much broader population.

Some evidence suggests that sub-Saharan Africans buy phones in order to fit in with neighbors or take advantage of social networks for non-economic reasons. But

cost-benefit calculations are probably at the heart of mobile phone adoption.

Given how many Africans are seeking out and using mobile phones, and all they can do with them, enthusiasm about communications technology as a force for economic development and broader advances in human well-being is high: the iconic image of the mobile phone user in Africa is the female trader, surrounded by her goods while making calls to potential clients in the capital city. Peruse any article on mobile phones in Africa today and you can’t help but notice the ambitious claims about impact. Mobile phones are a transformative technology that increases GDP and, quite simply, revolutionizes people’s lives. Equally common are the slogans of mobile phone companies promising better days for those who use their products: “Together We Can Do More,” “A Wonder-

ful Life,” “Making Life Better,” and simply “*Tudo bom*” (“All is good”).

Do these images, slogans, and sentiments truly reflect what mobile phones can do? Can mobile phones transform the lives of the world’s poor?

There are some good reasons to believe that mobile phones could be the gateway to better lives and livelihoods for poor people. While some of the most fundamental ideas in economics about the virtues of markets assume that information is costless and equally available to all, low-income countries in sub-Saharan Africa are very far from that idealization. Prior to the introduction of mobile phones, farmers, traders, and consumers had to travel long distances to markets, often over very poor roads, simply to obtain price (and other) information. Such travel imposed significant costs in time and money.

Mobile phones, by contrast, reduce the cost of information. When mobile phones were introduced in Niger, search costs fell by half. Farmers, consumers, and firms can now obtain more and in many cases “better” information—in other words, information that meets their needs. People can then use this information to take advantage of arbitrage opportunities by selling in different markets at different times of year, migrating to new areas, or offering new products. This should, in theory, lead to more efficient markets and improve welfare.

An emerging body of research suggests that perhaps theory is meeting reality. In many cases, these economic gains from information have occurred without donor investments or interventions from non-governmental organizations. Rather, they are the result of a positive externality from the information technology (IT) sector.

In Niger, millet, a household staple, is sold via traditional markets scattered throughout the country. Some markets are more than a thousand kilometers away from others with which they trade. The rollout of mobile phone coverage reduced grain price differences across markets by 15 percent between 2001 and 2007, with a greater impact on markets isolated by distance and poor-quality roads. Mobile phones allowed traders to better respond to surpluses and shortages, thereby allocating grains more efficiently across markets and dampening price differences. Mobile phone coverage also increased traders’ profits and decreased the volatility of prices over the course of the year.

The benefits of mobile phones are not limited to grain markets or to Africa. Robert Jensen, a UCLA economist, found that

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in the Indian coastal state of Kerala, mobile phones reduced price differences across fish markets by almost 60 percent between 1997 and 2001, providing an almost-perfect example of the “Law of One Price”: when markets work efficiently, identical goods have the same price. Even more impressive, mobile phones almost completely eliminated fisherman’s waste—the catch left unsold at the end of the day—by allowing fishermen to call around to different markets while at sea, choose the market with the best price, and sell accordingly. Mobile phones resulted in welfare improvements for both fishermen and consumers: fishermen’s profits increased by 8 percent, and consumer prices declined by 4 percent.

African governments, donors, mobile phone companies, and NGOs recognize the potential of mobile phones in many arenas of economic development. An emerging trend is the development of mobile phone-based services and products—applications or “apps”—that go beyond basic voice calls. In wealthy countries apps have mainly been sources of entertainment, but in poorer countries, they provide opportunities for disseminating market information, monitoring health care, and transferring airtime and money. In most cases these apps are developed by the private sector and then adopted (and adapted) by the development community. Projects in agriculture, health, education, and governance increasingly rely on the services uniquely available via mobile phones.

Health practitioners have been at the forefront of using mobile phones as a development tool in Africa. Mobile phone services monitor measles outbreaks in Zambia; support diagnosis and treatment by health workers in Mozambique; and disseminate health-education messages in Benin, Malawi, and Uganda. In Malawi mobile phones not only remind HIV-positive patients to take their anti-retroviral drugs, but also allow community health workers to share information on their patients’ status, saving considerable time and money.

from *Thread*

*So, Alyosha, maybe it is true
that we live in perhaps.*

Perhaps the earth . . . perhaps the sky . . .
chemical winds, auroras, tides,
chalk hills and blistered pines
and the microtonal bells.

And those who swallow ink
(the ringers of bells),
perhaps they will inherit
the bogs and salt marshes,
the swamp grass and samphire,
jacket with torn pockets, shredded cuffs.

Will inherit the sea-foam, the dust,
the ferrous mud
that reabsorbs us.

—Michael Palmer

Short message service (SMS, or texting) has been a powerful tool for election monitoring on the continent, often overcoming large logistical challenges—organizing volunteers, identifying violations, and verifying results—by adapting traditional observation methodologies to the mobile phone. One such methodology, parallel vote tabulation (PVT), uses vote counts collected by trained observers at a representative sample of polling stations to track and verify election results. Traditionally, vote reports are sent via phone calls, radio, or messengers on motorbikes. In countries with limited infrastructure and communications system, a PVT process could take days, even weeks. During the 2008 presidential elections in Ghana, a thousand locally trained PVT observers were able to transmit electoral results

and violations via SMS to a central system, thereby giving almost instantaneous independent verification of the election results.


Mobile phones have been used in other ways to promote good governance, mainly via voter-education and registration campaigns and citizen-based monitoring, which differs from PVT in that it depends not on trained observers, but on “crowdsourcing.” Crowdsourcing involves outsourcing a task to a large group of people and allows regular citizens to report election abnormalities or violence via SMS or calls to a centralized server. Following the 2007 election in Kenya, citizens reported on escalating violence via voice, SMS, and the Web. The updates were mapped in real time using a software platform called *Ushahidi*, “testimony” in Swahili, and

delivered to the entire world. *Ushahidi* recently was used to facilitate search-and-rescue operations following the earthquake in Haiti, allowing individuals to send messages on the locations of survivors, which were then mapped and broadcast to rescue teams. Because anyone may participate in crowdsourcing, its accuracy is questionable. But the problem has been overcome at times thanks to local NGO efforts to verify reports.

Simple and affordable mobile phones are also being used as a means to promote adult literacy in Africa. In addition to a regular literacy curriculum, adults in the Nigerien village of Falenko learn where to find letters and numbers on a mobile phone and how to send and receive SMS messages. Within four months, students are able to practice their newly acquired literacy skills by sending SMS messages to their friends and family. In a country without vernacular newspapers and village libraries, SMS makes literacy functional. Early results suggest that students who use a mobile phone as a learning device make faster progress and achieve greater literacy than those relying solely on traditional classes. Similar mobile-literacy projects are starting in Senegal, and others in India are using smart phones and mobile games as teaching tools for children.

Of all the mobile services and products, financial applications (“m-money”) have received the most attention, and M-PESA, Kenya’s mobile money-transfer program, has been at the center of it. M-PESA (“M” for mobile; “PESA” for “money” in Swahili) facilitates a variety of financial transactions, from purchasing airtime to paying bills, though the majority of M-PESA’s seven million subscribers use it exclusively to transfer money. Since M-PESA’s inception in 2007, users have transferred more than \$3 billion.

M-PESA grew quickly because the formal Kenyan banking system is so limited. In 2006 there were only 450 bank branches and 600 ATMs in the country, mostly in urban centers. To transfer money to friends and relatives around the coun-



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Educating Minds and Hearts to Change the World

try, Kenyans could use Western Union or the post office, rely on an intermediary (for example, a bus driver), or ask a friend or relative. Wire transfers via Western Union or the post office were secure but often expensive and unavailable in remote rural areas. Transport services or sending via a friend or relative was more accessible but carried high risk of theft. By contrast, sending a thousand Kenyan Shillings (about \$13) from Nairobi to the Western provinces via M-PESA costs 40 percent of the post office rate and 20 percent of the bus rate. Secure, low-cost, convenient, and fast, M-PESA has effectively displaced other options.

Olga Morawczynski, a researcher at the University of Edinburgh, has found that M-PESA allows urban migrants to send money to rural relatives quickly, helping those households better cope with health or climatic shocks. The application has been useful for rural-to-urban transfers as well. Following the 2007 elections, residents of Nairobi's Kibera slums were effectively cut off from basic necessities, as the government tried to control outbreaks of violence. M-PESA transfers from relatives in rural areas provided Kibera residents access to much-needed cash. Apart from money transfers, M-PESA is being used as a savings vehicle and billing platform.

M-PESA is clearly a useful tool for transferring funds, but what about the more ambitious claim that it and similar m-money services are effectively "banking the unbanked"? The nature and extent of m-money's impact on the welfare of poor users is not so clear. Will these systems succeed in doing what banks, governments, microfinance institutions, and NGOs have not?

As of now, it isn't likely. Many m-banking systems in developing countries are not technically *banking*, for both financial and legal reasons. They do not provide interest on savings, nor do they allow poor households to obtain credit from formal financial institutions. Moreover, the money stored in users' accounts is usually not protected by deposit insurance. All of these are important aspects of truly being "banked" and are crucial to long-term economic development. In short, m-banking has some benefits, but it is important not to oversell its promise.

In 1999 less than 10 percent of rural Africans lived in areas with mobile phone coverage. Today, that number is more than 60 percent. By the time of the 2012 Olympics, most villages will have coverage, with only a handful of countries—Guinea Bissau, Ethiopia, Mali and Somalia—relatively unconnected.

But such figures are deceptive. There have been huge disparities in the geographic rollout of coverage, prompting claims of an intra-African digital divide.

The decisions about when, where, and how to provide mobile phone coverage have been primarily driven by economic considerations. Service providers constructed mobile towers in countries with higher demand (high population densities and wealthier populations), lower costs (flat topography and access to paved roads), and an enabling policy and regulatory environment.

Mobile phone companies followed these rules within countries as well: In Niger and Mozambique, service providers first focused on urban centers before setting up access in more remote and less densely populated regions. Favorable policy environments have facilitated the expansion of these networks in some countries, such as Uganda, which instituted initiatives to encourage mobile phone companies to provide network coverage to rural areas.

The disparities in access are part of a larger problem of infrastructure and governance in Africa's poorest countries, problems that investment in telecommunications alone cannot solve. Mobile phones can enhance delivery of and access to resources and information, but they cannot replace crucial public goods such as roads, power, and water: only 29 percent of the continent's two million kilometers of roads are paved, and sub-Saharan Africa has *one percent* of global electricity capacity.

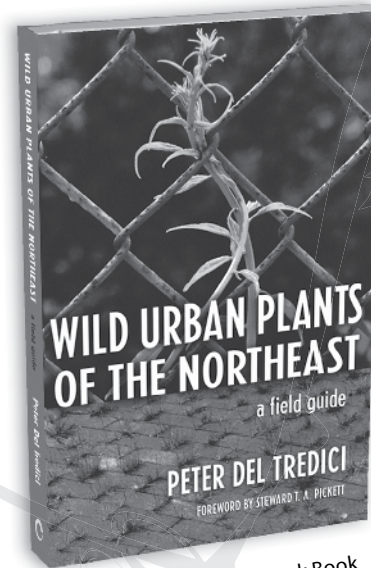
In the face of these hardships, phones can do only so much. Without roads, farmers and traders in Zinder might have access to price information but be unable to actually transport their goods to the market. Without power, a furniture maker in the Kibera slums might be able to take an order from a customer but be unable to work efficiently for lack of available light. Without health centers, parents might know that they are supposed to take their child to a clinic when she is malnourished, but be left with nowhere to turn.

Investment in mobile phones needs to go hand in hand with investment in physical, financial, and human capital. The private sector has the resources and expertise to develop innovative products in and for Africa that rival those in high-income countries. And the public sector can facilitate access to these services for the poor and provide services that the mobile phone companies cannot.

Yet even if the public and private sector work together, universal access to mobile phones remains a problem. The cost of mobile phones and services has reduced drastically in recent years, but the technology is still financially out of reach for about half of the continent's population. In Niger the cost of an out-of-network call is \$0.38 per minute—40 percent of a household's daily income. Introducing competition via changes in IT policy can drive the price down. After Kenya's IT sector was partially liberalized in 2008, new mobile phone service providers entered the market, and prices of domestic mobile phone calls fell from about \$0.33 per minute to \$0.10 per minute. Moreover, four phone companies now vie for customers by offering premium services such as M-PESA. The right national policy can therefore benefit poor consumers.

Will mobile phones lead Africa out of poverty? Years of development experience have taught us that there are no magic bullets. The promise of economic development in Africa cannot be fully realized in the absence of roads, schools, electricity, and finance. When IT is appropriately integrated into this larger framework, Africa's transformation will finally be underway. ♦

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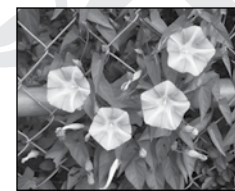
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