



RURAL REALITIES, REAL SOLUTIONS

ICTs for rural development

A SANGONet CONFERENCE



“Poverty is almost always equated with isolation in many places of the world. Poverty results from the lack of access to markets, to emergency health services, access to education, the ability to take advantage of government services and so on,” Sachs said. “What the mobile phone -- and more generally IT technology -- is ending is that kind of isolation in all its different varieties.”

JEFF SACHS, INTERVIEW BY CNN, “MOBILE PHONE: WEAPON AGAINST GLOBAL POVERTY”

Introduction: Fulfilling the Promise

The potential of information and communication technology (ICT) to revolutionize development is real, but it's far from being realized. For every m-Pesa, dozens of applications never get past the piloting stage. And, there are many remaining questions regarding effectiveness. A decade after mobile technology began blazing trails across the continent, it's time to take stock. What challenges has ICT met, and which remain? What can we do to overcome them? How can we best realize the enormous potential of ICTs in rural development?

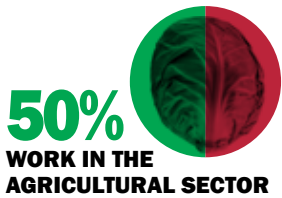
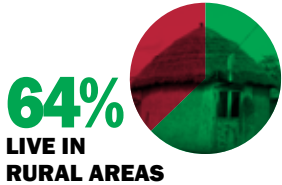
SUB-SAHARAN AFRICA IS STILL MOSTLY RURAL, WITH SOME **64%** OF THE POPULATION LIVING OUTSIDE CITIES. IT WILL REMAIN PREDOMINANTLY RURAL FOR AT LEAST **ANOTHER GENERATION**.

THE PACE OF URBANIZATION HERE IS SLOWER THAN IN OTHER REGIONS, AND THE RURAL POPULATION IS **EXPECTED TO GROW** UNTIL 2045.

THE MAJORITY OF RURAL RESIDENTS MANAGE ON **LESS THAN \$1.25** PER DAY, AND FROM 1988 TO 2008, THE NUMBER OF PEOPLE LIVING IN EXTREME POVERTY **GREW** FROM **172 MILLION** TO **306 MILLION**.



DEMOGRAPHIC SNAPSHOT RURAL SUBSAHARAN AFRICA:



Context: Why Rural Development?

Any development agenda must look beyond the cities, and for a simple reason—more than three-quarters of the world's poor live there. Rural development is a particular imperative in sub-Saharan Africa, where the ranks of the rural poor have swelled to more than 430 million over the past two decades.¹ Despite a pull to the cities, the rural population is set to grow for at least another generation.

Life has never been easy in rural areas. Without infrastructure and market linkages, smallholders cannot compete with northern agribusiness or withstand commodity price drops. Others lack access to the tools and opportunities necessary to participate in the non-farm economy. They enjoy few buffers against external shocks: droughts, sudden illness, or the death of a family member portend lifetime devastation. Such events have thrown millions of households on the continent into poverty.

But beneath this bleak picture lies tremendous potential and untapped opportunity: Agriculture in sub-Saharan Africa could drive growth for the entire continent. International food prices remain high, the world's population is projected to grow to 9 billion by 2050², and much of the world's underused, arable land sits in Africa. To participate in the opportunities the global food market presents, farmers need an enabling environment—not just roads, dams, ports, and irrigation, but also market infrastructure that would reduce risk and transaction costs.

Rural development, moreover, cannot happen through agriculture alone. Just half of the population in rural sub-Saharan Africa works in agriculture,³ and the other half faces rare formal employment and pervasive unemployment. As a result, rural development requires broad investment in non-farm livelihoods, as well as in social services, governance, and finance. Every sector—agriculture, health, education, governance, and financial services—faces particular constraints and opportunities, but they share three basic challenges in rural areas: access, quality, and cost.

- **Access:** Vast distances and poor road networks isolate rural areas, leaving those who live there poorly integrated into their economies and polities. Across sectors, lack of access to goods, services, infrastructure and information increases household vulnerability to shocks and prevents participation in growth.
- **Cost:** High delivery costs discourage providers of goods and services from reaching the countryside. Those that do venture afield pass on delivery costs to residents. Additionally, rural residents seeking basic medical care, decent education, or central markets often must leave home to get it, incurring extra transportation and accommodation costs or suffering associated losses like foregone wages and product spoliation.
- **Quality:** Isolated areas attract fewer and less qualified professionals, civil servants, skilled workers, and innovators than urban centers. Those posted there may be less willing or able to adapt to the community. The results: weak service delivery and poor outcomes.

1 International Fund for Agricultural Development. Rural Poverty Report. 2011 (reporting that from 1988 to 2008, the number of rural people in sub-Saharan Africa living in poverty grew from to 251 million to 433 million).

2 Ibid.

3 Estimates based on Africa Development Indicators. The World Bank Group. 2011.

Opportunities: The acceleration of information and communication technology

The explosion of information and communication technology (ICT), especially mobile phones, has transformed the development landscape of rural sub-Saharan Africa. By integrating once-isolated people into economies and politics, mobile phones and their brethren are improving life for rural populations, sometimes dramatically.

The spread of ICTs is broadly associated with economic growth and poverty reduction. One study, based on data from 113 countries over 20 years, found that a one-percent increase in ICT resulted in growth in GDP of .03%. For mobile networks, the relationship appears more marked, with one percent growth in mobile networks correlated with a five percent increase in per capita GDP. Conversely, other studies have described a negative correlation between the use of ICTs and the human poverty index; that is, the more pervasive ICT use within a demographic, the lower the poverty rate.⁴ While these studies show correlation, not causation, ICTs can be a powerful tool for income generation and empowerment.

ICTs have long fostered rural development, of course, and radio, television, telephone mainlines, and computers and telecentres will continue to play an important role in the future. [Table 1.] These traditional ICTs have not made great gains in sub-Saharan Africa—usage has grown around 3 to 5 percent per year, compared to 60 to 80 percent for internet and mobile phone usage.⁵ But some of the traditional ICTs, especially radio and television, have a much deeper penetration than the new ICT technologies. And the virtues of traditional ICTs extend beyond their wide reach: By dint of their familiarity, ease of use, and accessibility to non-literate populations, they will remain vital to rural African development.⁶

But mobile phones differ in two important respects from other ICTs. First, they are easier for the rural poor to access than many other technologies, which tend to be more expensive and require infrastructure. For instance: Landlines have existed for decades, but only 3% percent of Africans had access to one⁷; in contrast, in the space of five years, mobile telephone subscriptions on the continent shot up from 12 percent to 45 percent.⁸ It's a similar story throughout the developing world, where most mobile subscribers now live.⁹ Already, network coverage extends to 80 percent of the global rural population.¹⁰

Second, mobile technology moves users into the realm of interaction. Once a one-way street for information, ICT today has created the continent's largest transaction channel, enabling users to buy, communicate, connect, organize and broadcast themselves. The more than 5.3 billion mobile subscriptions worldwide¹¹ represent more than 5.3 billion points of contact—throughout supply chains, between those who provide services and those who receive them, and between citizens and the state. They also imply platforms for entirely new networks.

Interconnectedness holds special promise for the rural poor, long isolated from information and neglected by service providers. With anticipated growth in smartphones and tablet computing, mobile technology itself is changing fast, and adding new dimensions to the ICT development landscape. ICT allows consumers and citizens to articulate their demands, and companies and states to respond with better-targeted services. This exponential growth in feedback will foster better data collection, more accountability on the part of service providers, and a smoother marketplace. From agriculture to education, banking to health, ICT has enormous potential to improve access and quality and to decrease costs.



PENETRATION OF MOBILE PHONES IN SUB-SAHARAN AFRICA:

3%

HAVE ACCESS TO A LANDLINE



40%

HAVE ACCESS TO A MOBILE PHONE



50%

OF MOBILE USERS ACCESS THE INTERNET VIA MOBILE



15%

OF MOBILE USERS HAVE SMARTPHONES



4 Cited in Ophelia Mascarenhas, "Broadening the Agenda for ICTs for Poverty Reduction: PICTURE-Africa," in *Information Technologies & International Development* 2010, 6: SE, 37-44

5 Do we need a footnote here?

6 David J. McKenzie, "Youth, ICTs and Development," *The World Bank Group* (citing World Bank, *World Development Indicators*, 2006)

7 International Telecommunication Union, *Global ICT Developments*, 2007.

8 International Telecommunication Union, *Key Global Telecom Indicators for the World Telecommunication Service Sector*, 2010.

9 International Telecommunication Union, *The World in 2010: ICT Facts and Figures*, 2010.

10 Ibid.

11 Ibid.

Mapping the landscape: The use of information and communication technology to reach and empower rural populations

Traditional development discourse tends to segregate agriculture, health, education, banking and governance into their own separate domains. To be sure, every sector has its own features, challenges, and opportunities. But the use of ICT over the past decade underscores commonalities, and in every field, practitioners are already using ICT to address shared challenges of access, quality, and cost. In many cases, their innovations have applicability across traditional sectors. For instance:

- Handheld computers and text messaging enable the collection of high-quality, low-cost data on rural populations, which in turn permits better service provision.
- Call centers staffed by skilled workers provide guidance on health, farming practices, and weather. In the emergency response context, call centers allow people living in remote areas to report trouble and seek assistance.
- For farmers and traders, ICT enables rapid dissemination of information about commodity prices, supply gluts or market fluctuations, allowing them to mitigate yield losses. Feedback on student performance permits teachers to adapt teaching style and lessons to student needs. Doctors and health administrators also use real-time information to better track and triage patients, who in turn use ICT to better manage their own health.
- Mobile tracking prevents leakage up and down the supply chain, allows the traceability increasingly crucial for smallholder sales, provides for improved inventory management, and impedes drug counterfeiters.
- mMoney solutions not only permit the unbanked to create formal accounts, but also facilitate savings, insurance and credit to finance assets or basic services such as water and sanitation. Beyond financial products, mMoney also provides a platform for new business models that link payments to delivery of other mServices.


















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In some cases, ICT has even enabled the convergence of sectors, serving as platform for more holistic development. There are many examples of ICT interventions that cut across traditional sectors: introducing micro-health insurance and health-savings account through mobile devices; index-based crop insurance; and crowd-sourcing to monitor and manage the delivery of public services. These innovative applications recognize and leverage commonalities between sectors, blur traditional lines, and open up a new field of opportunities.

Figure 1: Typology of the use of ICT across selected sectors

Increasingly, ICT solutions and interventions have produced approaches that can be applied across sectors. They can be categorized into certain typologies:

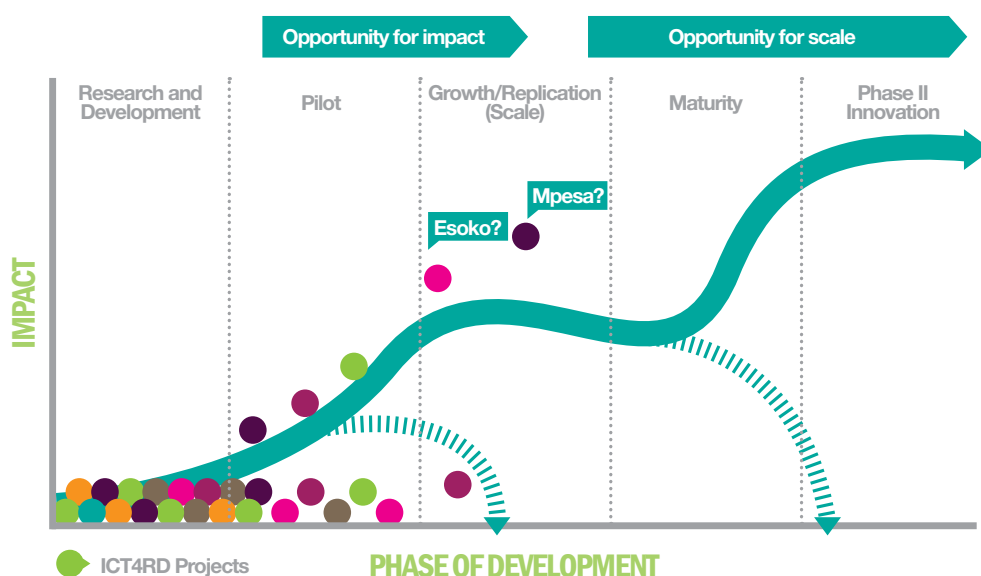
Sector/ Typology	Agriculture/ Livelihoods	Health	Education	Governance	
Data collection	<ul style="list-style-type: none"> Pest control input/feedback Productivity recording HH survey management 	<ul style="list-style-type: none"> Maternal health/public health data collection Patient registration 	<ul style="list-style-type: none"> Student assessment/ performance modules 	<ul style="list-style-type: none"> Election monitoring/tracking 	
<p>ICT enables rural areas to participate in the world of smart analytics and data-driven decision-making. Innovations include remote data collection and farm-condition analytics, as well as remote patient diagnosis and follow-up. In other sectors, ICTs lets headmaster track and adapt to student learning outcomes, bankers to monitor and advise on farmers' cash usage patterns, and government officials to analyze and respond to public service interruptions.</p>	Information/ promotion	<ul style="list-style-type: none"> Market pricing/information Agricultural marketing Soil fertility management Disaster/early warning 	<ul style="list-style-type: none"> SMS based health information and education 	<ul style="list-style-type: none"> Libraries/literature <p>Worldreader.org books for all</p> 	<ul style="list-style-type: none"> Advocacy Aggregation of citizen response, monitoring and
<p>Officials, development practitioners, and the media have long used ICT to deliver information to isolated people. They will continue to do so. But across all sectors, ICT has introduced a new dynamism and interactivity into information flows. For instance, a number of organizations provide market pricing information to farmers – while allowing them to offer crops to interested buyers. Farmer radio stations use SMS and voice messaging to bring listeners directly into their broadcasts. Through HIV/AIDS helplines, public health practitioners counsel patients from thousands of kilometers away. Teachers use ICT to communicate with parents about their child's education needs, micro-lenders introduce and promote new services, and governments alert the population to changes in public services.</p>	Training and/or diagnostic support	<ul style="list-style-type: none"> Farmer helplines/information services 	<ul style="list-style-type: none"> Professional certification (AMREF Virtual Universities) Remote diagnostic tools for disease surveillance and treatment 	<ul style="list-style-type: none"> Online learning modules/ tutoring services Language/ literacy training Exam preparation 	
<p>By disseminating best practices and through training programs, ICT can improve the quality of human capital in rural areas. Existing services include farmer helplines that support agricultural decision-making, training for primary and secondary school teachers, professional healthcare courses, and financial literacy programs. As delivery mechanisms spread across rural areas, services will cater better to the needs and preferences of the rural population.</p>	Service delivery (including supply chain management, call centres and remote response)	<ul style="list-style-type: none"> Agribusiness supply chain tracking and monitoring 	<ul style="list-style-type: none"> Supply chain management for vaccines/ drugs Anti – counterfeiting applications Medical call centres Emergency response 	<ul style="list-style-type: none"> Management of supplies, materials 	<ul style="list-style-type: none"> Aggregation of information to improve service delivery Election monitoring 
<p>Because of limited rural infrastructure and the weak demand associated with low population densities, supply chains in rural areas can be extremely inefficient. Last-mile mobile technology gives small-scale producers and traders to access to the formal sector's toolbox– inventory monitoring, supply tracking, and faster ordering and payment processes. They're especially crucial in agriculture and healthcare, which depend on timely and reliable supply of materials and medicine.</p>	Reminders/ behavior change support	<ul style="list-style-type: none"> Remote extension services 	<ul style="list-style-type: none"> Treatment adherence Automated SMS health tips 	<ul style="list-style-type: none"> Information for parents, teachers, students, 	
<p>Forgetfulness costs, and mobile technology can prevent it, whether reminding farmers to add fertilizers on the right day, or patients to take vital dose of medicine. ICTs allow for "mass-customization," enabling users at the base of the pyramid to register their preferences as easily as those at the top. Reminders can also help parents pay schools fees on time and improve loan performance, which in turn reduce follow-up costs for service providers.</p>	Financial services* (payments, insurance, etc)	<ul style="list-style-type: none"> Weather based index insurance Input payments Remittances 	<ul style="list-style-type: none"> Health savings accounts Micro health insurance Mobile based life insurance 	<ul style="list-style-type: none"> Payment of school fees Asset financing Educational loans 	
<p>Among ICT's most powerful—and empowering—applications is the facilitation of financial transactions, from payments for products and services to access to micro insurance and micro credit products. The story of financial services' growth shows how ICT innovations apply across traditional sectors and points up opportunities for convergence. For instance, MPESA and early mMoney rollouts initially focused on access to basic bank accounts, transfers, and payments. But MPESA quickly evolved beyond banking by phone to support savings, credit, and even insurance payments. And today, developers have designed a suite of financial products and services, tailored to rural demand, that cut across traditional sectors: crop insurance for smallholders, mandatory health savings accounts for low-income pregnant women, prepaid financing for utilities like electricity, even asset-based financing for solar lighting.</p>					

* The use of technology – particularly mobile – to drive financial service provision is perhaps an example of where we see the convergence of sectors (and perhaps technologies) in the future. In addition to providing access to a basic suite of formal or semi-formal financial services such as accounts, transfers (remittances) and payments, technology is also enabling access to a deeper set of financial services such as savings, credit, insurance and even pensions that are catered to the unique needs of rural communities.

Looking ahead: A number of cross-cutting issues have emerged which can inhibit or accelerate ICT's ability to drive rural development

The potential applications of ICT in rural development are legion, and many have yet to be imagined. Overall, ICT could end the isolation that keeps hundreds of millions of people in Africa living in poverty, disconnected from their elected representatives, and unable to participate fully in the global economy. But given such great potential and promise, ICT boasts few runaway successes. Instead, many projects are languishing in pilot mode.

DEVELOPMENT INNOVATION CURVE



But given such great potential and promise, ICT boasts few runaway successes. Instead, many projects are languishing in pilot mode.

It's clear that we must begin identifying, understanding, and addressing a number of challenges. This is a discussion for all stakeholders—investors, donors, developers, practitioners, consumers, and regulators—that will require some difficult decisions. It will also require the long view, focused on helping ICTs deliver on their promise for rural development. Undoubtedly, each sector has its own complications and needs. But some issues should be addressed together.

Achieving scale and sustainability requires attention to three broad, overlapping areas: demand, supply, and environment.

Achieving scale and sustainability requires attention to three broad, overlapping areas: demand, supply, and environment. **Demand** centers on end users of ICT, both customers and beneficiaries: it implies knowing the end user's needs and habits, ensuring enough space for feedback, and responding quickly to information on hand. **Supply** considers ICT from the practitioners' and innovators' point of view. It encompasses funding, incubation space, measuring results, business models and strategies for growth, and coordination between partners. Finally, an **enabling environment** is the matrix of policy, infrastructure, and investment that serves as the foundation for ICT innovations. Accelerating ICT4RD market growth requires addressing the challenges in each of these domains with concerted focus and disciplined decision.

Demand: Historically, supply has driven ICT innovation, not demand. But few products will achieve scale or sustainability unless they address their customers' needs, preferences, and habits. Above all, sustainable ICT must know and adapt to its end users, and let demand guide supply.

- **Do we know the rural end user?** Most of us don't; indeed, the more we learn about rural populations, the more we realize how *little* we know. That's not necessarily bad news, because a more profound understanding of demand for products and services unlocks more and **better opportunities** for deployment.
- **Are we translating user demands and preferences into the right products and services?** Knowing the end user is not enough; one must design with him or her in mind. Innovations that speak to existing behaviors or processes are easier to adopt, as are those that fill an existing gap. Customizing content, understanding appropriate use, and, in some cases, incorporating mechanisms for ongoing feedback, are all critical.
- **How do we capitalize on demographic trends in ICT adoption and use?** Like any market, the rural population is not monolithic, and demographic patterns in ICT use should inform our deployments. For instance, young people tend to adopt technology more quickly, while rural women tend to resist it.
- **Who should pay, and how much?** "Free" or subsidized products may accelerate access and promote adoption. But they also threaten to inhibit competition and cannibalize market potential.

Supply: Technological innovation takes place at a rapid, sometimes dizzying clip. Although a breadth of devices, technologies, and applications exist, countless more are emerging. Some cast older technologies into obsolescence. Supporting supply means helping the best of these innovations flourish and achieve scale and sustainability.

- **Why are so many ICT deployments small scale or stuck in pilot mode?** Excitement about the potential of ICT4RD applications has so far outpaced results. Overall, ICT deployments remain fairly small and fragmented, with few "market winners," and the innovation curve plots most ICT4RD deployments stalling at the pilot phase. It's not clear that we should expect more success stories at this point, but it is certain that there is room for improvement: leveraging opportunities for convergence, access to large-scale financing, and aligning financing with real results.
- **How can we measure impact?** This is an especial concern for donors. Outside the feedback loop of the marketplace, it can be difficult to determine which ICTs are worth supporting and which are not.
- **How should the private sector engage, and what models exist beyond CSR?** Across markets, companies targeting the Bottom of the Pyramid are eager to add ICT or integrate ICT into their offerings, but most haven't figured out how to turn profits from it. As a result, most large companies have shunted ICT4D investment to their corporate social responsibility departments, and purely commercial plays are rare. Although CSR has supported some large-scale, sustainable programs, including Novartis' SMS for Life and Vodaphone's M-Pesa, social returns remain a tough sell for shareholders. Realizing profits may require a shift toward higher volumes, lower margins, and a longer time horizon.
- **What approaches to R&D will drive creativity, innovation and rapid prototyping of good ideas?** If Kenya is any example, incubators work especially well. Flagship incubators, such as iHub and mLab, have driven ICT to outperform all other sectors over the last decade, growing an average of 20 percent annually. (Some call Nairobi the "Silicon Valley of Africa.") Not coincidentally, Kenya is home to the world's largest mobile money deployment. But incubators are not a cure-all for R & D, and they require services, partnerships, and other inputs for success. E-business incubator failures in the early 2000s in South Africa suggests there is no easy route to success.
- **Where are ICT products and services converging across traditional sectors, and how should we foster and leverage this convergence?** Convergence has tremendous potential for scale and impact. Rural supply chains need not be limited to health OR agriculture. In particular, mobile money can facilitate a

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Technological innovation takes place at a rapid, sometimes dizzying clip... Supporting supply means helping the best of these innovations flourish and achieve scale and sustainability.

range of transactions across sectors, including payments across supply chains, insurance for crops, and other investment vehicles.

- **How can innovation harness the multi-directional flows of information that ICT allows?** The interactivity inherent in Internet technology allows companies to collect customer data, young people in social networks to educate each other about sexual health, and developers to refine and adapt their technology to changing consumer preferences.

Enabling environment: Supply thrives in an enabling environment, which includes sound and stable infrastructure, appropriate investment, and a host of ICT policies and regulations. More than 20 countries on the continent now have Ministries of ICT charged with designing policies and regulations, channeling investment, and providing infrastructure support. There is no one-size-fits-all regulatory matrix for fostering ICT and supporting scale and sustainability, but the following questions and considerations are useful.

- **What are the ingredients of an innovation-spurring ICT policy?** In 2002, only 16 African countries had formal ICT policies, but since then, at least 21 more have developed new policies.¹² Generally, they should seek to balance the imperative of consumer protection with the need to spur and nurture innovation.
- **What alternatives are there for countries without widespread, stable infrastructure?** Countries short on physical infrastructure—from roads to electricity—tend to be best poised to gain from the deployment of ICTs in rural development, but beyond pilot programs, they may have a hard time attracting innovators and roll-outs. Where should investment go? Conversely, where should it not go? Identifying the ICT solutions with profound applicability to rural development is a challenge, in part because of the rapid pace technological innovation. A decade ago, the computer was king—only to be replaced by cheap laptops, MP3 players, mobile phones, smartphones, and tablets. The technological future for most Africans may well be a tablet—but it is probably something else entirely. Given the uncertainties and pace of innovation, investors should consider demonstrated impact and weigh whether the ICT is directly improving livelihoods, or mainly delivering improved operational efficiencies.

This conference and dialogue present a starting point

¹² <http://www.uneca.org/codi/Documents/PDF/Report%20on%20E-Strategies%20in%20Africa.pdf>

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