AFRICAN AGRICULTURE AND ICT: AN OVERVIEW

INTRODUCTION

This is one of a series of briefing papers to help USAID missions and their implementing partners in sub-Saharan Africa use information and communications technology more successfully—via sustainable and scalable approaches—to improve the impact of their agriculture related development projects including Feed the Future projects. ICT tools are helping address constraints in agricultural value chains and are offering new opportunities to use approaches, such as indexed weather insurance, that relies on digital weather stations and global positioning system information. Using ICT—radios, cell phones, computers, the Internet, digital cameras, and geographic information systems (GIS)—can reduce transaction costs, increase access to markets, improve productivity (e.g., by providing information on better farming practices), provide better and more frequent access to critical market information, and improve communication throughout the value chain. In short, using ICT can enhance results and help projects become sustainable and scalable beyond a typical project's reach.

For every successful ICT example, however, there are many more examples of poor return on investment and no sustainability, hence no possibility of scaling beyond a specific project's reach, no adaptability to improvements in ICT, and little or no industry buy-in. This paper highlights types of ICT interventions with promise and offers insight into how USAID can avoid common pitfalls in ICT, learn from past mistakes, and build on promising applications others are using. Future briefing papers will focus on specific types of ICT-enabled applications.

OBJECTIVES

FACET's objectives are to help USAID Missions and their projects to:

- Build upon best practices

- Avoid re-inventing the wheel

- Use cross-border solutions where appropriate

- Use ICT intelligently to meet or exceed ambitious goals in agriculture development

- Find sustainable and scalable ways to use ICT that do not rely on ongoing donor subsidies

ICT applications across the developing world that support agricultural development use radio, the Internet and increasingly, cell phones. Cell phone networks have opened up information flows to millions of rural communities. Cell phone services and the applications that take advantage of them (sometimes called mobile value-added services or m-applications) can provide solutions to many value chain constraints. For example, cell phones can provide better access to farmer advisory services directly on-farm and facilitate information sharing on a large scale.

Current market information helps strengthen linkages between actors both horizontally (e.g., among firms) as well as vertically (between buyers and sellers). Increased flow of information resulting from ICT also can change the relative power of value chain actors, often strengthening the role and "voice" of smallholder farmers in value chains.

In distributing and managing supply chains, cell phones have increased efficiency and predictability and reduced waste, benefitting all actors. Farmers' decision-making processes have been improved by applying ICT-provided information at six key stages: (1) what to plant, (2) seeding, (3) preparing land and planting, (4) growing, (5) harvesting, packing, and storing, and (6) selling.

ICT-based applications also use the Internet, GPS, and GIS databases for information management around quality grades and standards, weather and climate conditions, and traceability. The use of ICT applications in market information systems (MIS) can also make it possible to better predict and ensure reliability and timeliness of delivery, confirm target volumes, and ensure product quality, which are often as important to buyers as market prices.

The following table provides a quick glimpse at a handful of common ICT-enabled tools or applications in agriculture development projects today. The examples use different ICT "channels" such as radio, cell phone networks and the Internet. The examples are not necessarily sustainable or scalable without donor support, nor do they necessarily have the desired impact. In fact, knowing the impact of the ICT interventions themselves is rare, but would help make better decisions on whether to use ICT and how to use it cost-effectively. Note also that some of these interventions can be developed with little or no ICT.

Others can reach end users (e.g., smallholder farmers) using non-ICT "channels" (e.g., black boards at village stores) but can use ICT in the background to disseminate information.

Finally, some may be combined to increase value and the chances of sustainability (and hence scalability). For example, MIS is often combined with weather information and even information to solve common agriculture problems.

Using ICT to Improve	Why	Examples
Access to market information	To help farmers find out about market prices. This helps them make decisions regarding when to harvest, how to negotiate with intermediaries, and so on. Often combined with other information such as weather forecasts.	• Esoko (various countries in sub-Saharan Africa) • e-Choupal and Reuters Market Light (India) • Manobi (Senegal) • Infotrade (Uganda) • Zambian National Farmers Union MIS (Zambia)
Distribution and supply chain management and traceability	To increase efficiency and predictability, reduce spoilage, and more. To record movements along the value chain, respond to quality standard requirements, and help large buyers track, manage, pay, and reward small producers.	• Application across dairy sector (Kenya) • Dunavant Cotton (Zambia) • Infosys system for horticulture (India) • EJAB Bangladesh • SourceTrace (Costa Rica, Mexico)
Financial services (mobile payments, mobile banking)	To make financial transactions more accessible, faster, and safer, in addition to making it easier to save and link to financial services.	• M-PESA (Kenya and Tanzania) • Mobile Money (Ghana, Uganda, Zambia) • Standard Chartered Bank (South Africa Division: Loan appraisal, M&E software) • WIZZIT (South Africa)
Farm extension services, access to sector experience, research, and other resource information	Using ICT to deliver better farm extension services (utilization of best agriculture practices, research, weather, climate and more).	• Grameen AppLab Community Knowledge Workers (Uganda) • Farmer Voice Radio Project (Kenya) • IFFCO/Kassan Sanchar (India) • Radio (Mali and many others in Africa)
Commodity exchanges/ warehouse receipt systems	To provide transparency in price discovery and to facilitate better prices and efficiencies between buyers and sellers. It avoids moving crops themselves, reducing spoilage, transportation, and transaction costs. Exercises temporal and spatial arbitrage.	• Ethiopia Commodity Exchange (ECX) • Uganda Commodity Exchange (warehouse receipt system) • Zambian Commodity Exchange (ZAMACE) • SAFEX (South Africa)

ICT-enabled solutions follow a variety of design and operational models. Each model varies along several dimensions:

Dimension	Sample Types	Case Example
Operator	Cell phone service providers; third-party service providers; associations or cooperatives; public-private partnerships.	• Strategic partnership between fertilizer cooperative and cell phone provider (Bharti Airtel/IFFCO Kassan Snachar) • Joint funding by social entrepreneur, cell phone provider, and donor (Grameen Community Knowledge Worker/CKW, cell phone provider MTN, Gates Foundation) • Private for-profit with donor project paying for services, some start-up fees (Esoko with USAID/West Africa project)
Technical model	Multi-channel approach (e.g., via cell phones, PCs, radio, paper); cell phone networks using voice, text, data, or combination; different types of handsets; as well as different technical security approaches.	• MIS available via radio, cell phone, print (several countries) • Service adapted for low-end and high-end phones; CKW service (high-end phone) combined with Google SMS service (low-end phone) (Uganda)
Business model	How the application is sustained financially: fees charged, to whom; pay-as-you-go; advertising model; organizational subscriptions; franchises.	• Input provider advertising (Zambia market price information service) • Using "inbound" data collection for donor project impact evaluations to subsidize outbound services to farmers (Grameen CKW, Uganda) • Service sharing revenue with cell phone provider (freshConnect, India)
Government role (if any)	Ongoing subsidies; full operation; partnership with a private partner.	• Government provides weather information to private third party services in exchange with SMS upload utility to gather weather information (Ghana with Esoko) • Government runs commodity exchange (Ethiopia)
Donor role (if any)	Up-front financial or technical assistance; facilitating start-up in some way, such as organizing smallholder farmers in groups.	▪ USAID project provides up-front "capital" (grant) for third party m-payment and other agriculture related services (USAID/Zambia, MTZL) ▪ USAID project consolidates "demand" via farmer groups as initial customers (several countries)

LESSONS FROM THE FIELD

- **Facilitate the delivery of ICT-enabled services to maximize the potential for sustainability and scalability.** As with any value chain development activity, ICT-enabled interventions should be *facilitated* rather than carried out directly by a donor-funded project team. This means selecting private (and ideally, local) ICT providers through a transparent tender process for any ICT-related services and looking for opportunities for those already in the target value chain (e.g., input providers) to provide the services or help fund them. For example, in the agricultural inputs value chain in Zambia, an input firm gave advice and product information to farmers via SMS. Of course, there may be good opportunities for public-private partnerships with governments and international organizations.

- **Plan an exit strategy up front when using grants, subsidies and pilot projects.** Donor projects can be important catalysts for new ICT-enabled services for start-up capital in the form of grants or guaranteed customer fees for a set period. To increase the probability of sustainability and scalability, projects need to require service providers to figure out their business plans up front. Building in strong financial incentives for the service provider can work well so that the more successfully the service expands to serve a greater proportion of the target population, the more the provider earns. In India, USAID partnered with a private-sector IT firm to develop ICT-enabled applications on handheld devices that allow extension agents and farmers to communicate valuable information across the entire fruit and vegetable supply chain. This IT firm is now entering into commercial relationships with supermarket chains to further develop and apply the applications; a cell phone provider is involved as well as another donor.

- **Resist the urge to use excessive technology; use the lowest cost and simplest technology that can address the identified constraint.** This will increase the likelihood of the ICT activity being sustainable and scalable. Unfortunately, new and innovative technologies have a "coolness" factor for both project teams and end users. Sometimes vendors offer donations of equipment that is appealing but "overkill." An example of using the minimum technology needed comes from coffee cooperative farmers in Rwanda who had difficulty navigating new relationships with international buyers. The buyers were accustomed to direct email communication with suppliers for orders, shipments and visits, and expected quick response times. The introduction of simple email communication provided through mobile phone networks was enough to solve this major constraint, strengthening the buyer-cooperative relationship and enabling producers to better meet buyers' needs.

- **Look for opportunities to build on ICT already in use.** Before introducing new technology, find out what products and services are already available (across sectors) that could be employed or adapted to resolve the identified constraint. The rice sector in Mali faced many constraints to competitiveness. Mali has a community radio system that was already in use. By expanding the use of radio to convey price information, weather alerts and extension information, several key constraints were addressed.

- **Encourage sharing application development and operations across users to reduce costs.** Sometimes ICT-enabled services are just too expensive for individual farmers to afford. Sharing them among farmers or via an association may make them affordable and sustainable.

- **Consider the telecommunications legal and regulatory environment.** If access to and the price of ICT are constraints to its use by firms that need ICT-enabled services, consider working with the telecommunications enabling environment itself. Helping to improve the legal and regulatory environment for telecommunications to increase predictability of service, transparency and support for competition and innovation can have dramatic results in lowering costs and increasing accessibility for consumers. Many countries also have telecommunications universal service funds, which may subsidize improved access in rural areas where commercially viable services are not possible.

- **Measure impact.** All too rarely, projects try to measure the impact of the ICT intervention: Was it worth the investment? Did it add the anticipated value to the target users? This information is invaluable for other projects.

WHERE TO GO FROM HERE

Below are a few possible topics we may consider for future briefing papers in this series. We welcome readers' suggestions. What would you suggest?

- What are the impacts of "organic" uses of ICT technologies? We know from a study in Niger that cell phone access alone allowed small holder farmers to learn market prices, resulting in better prices for them *and* for end customers. Similarly, in Kenya agriculture players are using the M-PESA m-money service in many ways to reduce costs and innovate—with no "value-added service" needed on top of it. Where else are such "organic" services enough to have the impact a project seeks?

- What is the measured impact of specific ICT-enabled interventions? Where do we have cost effective models that work for measuring this?

- Does ICT reinforce poor or

unconstructive cooperative and competitive behavior? For example, do producers use MIS only in negotiations with traders, resulting in limited bargaining power? Or can they use such information to understand market dynamics and build better coalitions among farmers? Are there more ways to promote more effective horizontal usage of ICT that create more efficient vertical linkages?

- What, if any, ICT-enabled applications would help farmer groups work better—and individual farmers better understand their costs and net profits? Is ICT "overkill"?

- What can we learn from viable non-agriculture sector business models that use technology to excel, (e.g.,

soft drink companies and their distribution networks and mobile applications)?

- Are there opportunities to share "platforms" (the general software upon which ICT applications are developed, such as mobile application platforms) across sectors within a country and across borders?

- What opportunities exist to use ICT better to facilitate cross-border agriculture (and other sector) trade?

HOW CAN FACET HELP YOU?

FACET will soon release briefing papers on five content areas: access to market information, distribution and supply chain management, farm extension services, ICT solutions in financial services, and

commodity exchanges and warehouse receipt systems.

FACET will also seek ways to share information using other means, such as webinars. FACET can provide limited technical support to missions or projects tackling ICT-related challenges that are common to other projects. If you have suggestions, please contact Judy Payne, jpayne@usaid.gov. To be added to FACET's distribution list, please contact Josh Woodard, jwoodard@aed.org.

For further resources related to the use of ICT in agriculture development and for links to many of the ICT interventions mentioned in this briefing paper, visit:
https://communities.usaidallnet.gov/ictforag