

Strategic Note, May 2017

ICT solutions for service supply to farmers

Benefits to farmers and business

Information and Communication Technology (ICT) is an umbrella term that generally covers computers, the internet, telecommunications infrastructure, cell phone, radio, television, newspapers and digital libraries.¹ These technologies have been spreading rapidly and digitization is driving transformation in many sectors, including agribusiness. Transformation in agriculture is primarily driven by the need to reduce costs and increase farm efficiency amidst growing consumer demand as well as supply and price volatility.

As service providers are looking for ways to drive down transaction costs and improve operations and service supply impact at farm level, ICTs offer new ways to make production more efficient and increase revenues for farmers. Approaches range from using mobile technology to share agronomical and market information with farmers, leveraging digital solutions for farm planning and management, to digital finance such as mobile payment systems. The ultimate aim of all these applications is to create benefits to both farmers and business.

This note aims to help companies consider why and how to optimize service supply by using ICT solutions. It provides a brief overview of the landscape as well as an initial set of examples of how service providers are implementing these solutions.

The landscape of ICT solutions for agriculture

"There are promising examples, but few initiatives have reached true scale. I am not aware of any 'WhatsApp'-like products so far in the ICT4Ag space," Christian Merz, Senior Program Officer Digital Solutions, Bill and Melinda Gates Foundation

The proliferation of enabling technologies and infrastructure such as mobile connectivity, cloud computing and an enabling policy environment has resulted in a growing and diverse set of actors developing and implementing ICT solutions. Organizations range from large corporations primarily operating in the ICT and/or financial services sector, as well as small tech and agri start-up companies, to non-governmental and donor organizations. Solutions can broadly be distinguished into two main categories:

1. **Platform solutions** for application across different organizations and for different purposes as well as integration/interoperability (e.g. the Level 1 project on mobile money services²)
2. **Dedicated applications** for one particular purpose and often developed by an individual organization for in-house use (e.g. Mars' mobile based Farm Development Plan to manage farm renovation of its cocoa farmers).

Given greater potential for scale and replication, non-proprietary platform solutions tend to be the focus of investments by donors as well as ICT/financial services companies. Yet in practice many initiatives face challenges with reaching scale and replicating models across regions and countries.

¹ In practice, the term "ICT" is often used interchangeably with "digital solutions." The same approach has been adopted for this note.

² For further information see: <https://leveloneproject.org/>.

Identifying sustainable business models is considered as a key success factor for reaching scale.³ There is an array of revenue models emerging, including user based licensing, freemiums⁴, and revenue creation from data sharing or advertising. Issues such as ability and willingness to pay amongst farmers, farmers’ experiences and opinions towards innovation and technology, close customer relationship management and customer feedback mechanisms, as well as availability of affordable patient capital to finance scaling are important considerations for developing sustainable models.

The enabling environment also plays a critical role for uptake of solutions. Key relevant issues include a favorable policy and regulatory environment as well as affordability and accessibility of ICT and other supporting infrastructure. The table below provides examples for each.

Issue	Examples
Favorable policy and regulatory environment	<ul style="list-style-type: none"> • In the case of mobile money solutions, banking and Know-Your-Customer regulations need to allow for effective use of digital solutions • Information security needs to be protected • Competition regulation needs to be supportive • The use of certain technologies is prohibited in some countries (e.g. drones)
Affordability and accessibility of ICT and other infrastructure	<ul style="list-style-type: none"> • Availability and affordability of communications infrastructure (e.g. broadband, data packages) • Availability of other relevant infrastructure (e.g. electricity) • Mobile phone penetration • (Computer) literacy level of end users

ICT solutions hardly work in isolation and tend to be applied in the context of a broader set of services; hence, assessing results and attributing impacts to specific ICT interventions can be difficult. However, despite this challenge there is an opportunity for making more data and insights available on what's working and what's not to support further learning and uptake of promising examples that are being developed and implemented.

Practical solutions for service supply

We have defined the three following use case areas of ICT solutions for service supply and provide practical examples for each below:

1. Agronomical and market information
2. Farm management and planning
3. Mobile payments and other financial services

Agronomical and market information

The ability to access agronomical and market information remains one of the key constraints to farmers. ICT solutions can overcome this challenge by ensuring that large numbers of farmers get

³ Siewertsen et al. (2016) *How to Grow and Sustain the Digital Harvest?* AGRA, The MasterCard Foundation, Advantech Consulting. Nairobi, September 2016, available at: <https://www.rafllearning.org/post/ict4ag-business-models-how-sustain-and-grow-digital-harvest>.

⁴ A pricing strategy by which a product or service (typically a digital offering or application such as software, media, games or web services) is provided free of charge, but money (premium) is charged for proprietary features, functionality, or virtual goods.

information about agricultural practices to increase skills and adoption rates, and/or provide access to current market information, thus reducing information asymmetry and bypassing intermediaries. Some of the most common knowledge and information transfer uses include: market demand and price information; weather, pest, and risk-management information; and best practices to improve agricultural efficiency and meet quality and certification standards. The case example of **Digital Green** below explores how the organization is using locally produced videos to share agronomical information.

Case 1: Digital Green - Using locally produced videos and a mobile application to share agronomical information and facilitate market access

Digital Green is a not-for-profit international development organization founded in 2008 that aims to increase the productivity of smallholder farmers by making agricultural extension services more effective. To do this the organization partners with public, private and civil society programs and communities to produce, disseminate and monitor the impact of short, locally-relevant videos that share knowledge and increase the uptake of improved agriculture practices.

Digital Green's video-enabled approach to service supply started with an initial 15-month trial conducted in collaboration with an Indian NGO and compared results of four different models: (1) a “traditional” approach to extension using demo plots and exposure visits; (2) a video-based approach; (3) a poster-based approach using still frames from the videos; and (4), an audio-based approach using mp3 recordings from the videos. The latter three all made use of local facilitators to present the content and lead farmer engagement. This facilitation and the video-based approach showed best results in terms of farmer adoption rates of new practices promoted and costs per adoption/farmer.

Since then, Digital Green's approach has been further refined and replicated across South Asia and Africa. After assessing farming needs, frontline workers (existing extension officers of government, NGO, or private agencies) and content producers create localized video content addressing the identified needs through sharing best practices. Videos can be accessed online, but are also distributed to communities and villages via pico/mobile projectors. Frontline workers are equipped with necessary training equipment (DVDs, TVs, projectors) and facilitate the training sessions to optimize farmer / villager adoption of practices. The main costs of Digital Green's B2B model include operational costs for equipment, content producers and facilitators, as well as Digital Green staff time to provide training on video production, facilitated screenings, and data collection. In the case of collaboration with government agencies, the latter tends to be covered by donor funding, while private sector organizations cover all other types of costs.

Since 2008, over 1.5 million individuals have been reached with video content. Digital Green’s approach was found to be 10 times more cost-effective and uptake of new practices seven times higher compared to traditional extension services. Beyond key performance indicators around adoption rates and cost effectiveness (for which key statistics are available online), the organization also assesses impacts in terms of production efficiencies and welfare gains using randomized control trials.

Snapshot of selected Digital Green's key performance indicators (since 2006)⁵

Key Statistics

Groups attending disseminations	Number of videos shown	Adoption rate	Average disseminations per day	Average attendance per dissemination	Villages with recent disseminations
110118	4412	60.77 %	122.57	17.55	416

⁵ For further information see: https://www.digitalgreen.org/analytics/overview_module.

Building on its existing farmer networks and based on the recognition that access to markets and market information is another key constraint faced by farmers, in 2015 Digital Green launched Loop, a human-mediated mobile phone application that improves farmers access to markets by helping them to aggregate their perishable produce. As part of Loop, Digital Green has nurtured village-level entrepreneurs who recruit farmers, assess daily produce volumes, determine which nearby market offers the best price, arrange transport based on volume, and sell farmers' produce directly to wholesale buyers. By aggregating, entrepreneurs can choose and pay for transport and negotiate sale prices more efficiently. They record volumes and sales on the Loop mobile app, which automatically sends receipts to farmers via text messages. After completing transactions on behalf of all farmers, the entrepreneurs return to the villages to deliver same-day payment and earn a commission of their own. Loop also includes an interactive voice response (IVR) feedback mechanism for farmers.

Since its debut in August 2015, over 3,000 farmers from more than 10 villages have used Loop to sell over 5,800 tons of produce creating 1 million US\$ in farm incomes. Loop has cut their transportation costs in half and saves them anywhere from 4-8 hours each market day. The Loop process includes a feedback loop to inform market-driven content for the video-enabled service supply, and Digital Green is also piloting the transition from cash to digital payments.

Farm management and planning

Many farmers are unable to make informed farm management decisions due to lack of records of their farming activities and lack of diagnostic tools to understand how farming choices might impact production and/or income. At the same time, poor access to financial services is often linked to poor record keeping and lack of credible farm-level data. Digital solutions making use of soil, farm and agronomical data can support farmers with farm management and planning and can facilitate access to finance. The case example of [Mars' Farm Development Plan](#) below explores how the company is implementing a mobile application to support long-term management of cocoa farms.

Case 2: Mars - Supporting farm planning and management of cocoa farms through Farm Development Plans

"I don't think we could have a program like this without the ICT tool, but a fool with a tool is still a fool," Peter van Grinsven, Cocoa Development Director, Mars Singapore

Mars is a global manufacturer of confectionary, pet food and other food products and a provider of animal care services. Cocoa is one of the company's core raw materials, of which as much as 90% is produced by smallholder farmers.⁶ However, amidst a growing chocolate industry, according to Mars the demand for cocoa might even surpass the available supply significantly over the next decade. In addition to poor implementation of good agricultural practices and insufficient and/or wrong use of inputs, extensive cultivation practices and aging cocoa farms are among the key factors for low yields. Therefore, rehabilitation and renovation of cocoa farms is critical to guarantee sustainable cocoa production.

To secure a future for cocoa and the people whose lives depend on it, Mars is pursuing a range of strategies, including the deployment of a Farm Development Plan, a mobile-based application to support farm planning and management of cocoa farms.

⁶ Curtis et. al (2013) *Powering up smallholder farmers to make food fair - a five point agenda*. A Fairtrade International Report, May 2013. Available at: https://www.fairtrade.net/fileadmin/user_upload/content/2009/news/2013-05-Fairtrade_Smallholder_Report_FairtradeInternational.pdf.

Whilst technically possible, many farmers do not have the relevant knowledge or confidence to invest heavily in their cocoa farms to increase levels of productivity. Access to finance can help to speed up the process, but many farmers do not have the capacity to fulfill requirements such as business plans indicating when, where and how investments are made and expected to yield results. Farm Development Plan helps farmers to plan and manage farm renovation with month-by-month and year-by-year plans for investments and forecasts, as well as provision of coaching and monitoring on how to manage farm renovation.

The Farm Development Plan is part of a broader certification software program developed jointly by Mars, UTZ and the Grameen Foundation, for which Mars and UTZ provide the necessary data and calculations for farm development and certification respectively, and Grameen Foundation is leading the software development. Such “bundled software” allows for information to be collected only once for shared use by any of the programs such as Farm Development Plan, Certification reporting or Internal Management Systems and for smart reporting mechanisms, rather than collecting similar information and develop reports for each program separately.

When starting the development of Farm Development Plan in 2015, Mars’ overall intention was to find a tool to help farmers choose wisely whether or not they want a future in cocoa and, if so, to help them understand how this could be achieved. The initial driver was not to necessarily develop an ICT-based tool, but, given the complex nature of farm renovation and rehabilitation and the amount of data that needs to be calculated and processed on a regular basis, it became clear very quickly that a software-based tool would best meet these needs. In addition, the ICT-based tool allows for consistency in collection, recording and reporting of data and observations, and ensures consistency in the recommendations for farm rehabilitation and renovation through use of “smart logic.” Smart logic uses observations as a diagnostic of a farm and then generates the most suitable recommendation for farm rehabilitation or renovation. This approach also allows using indicators that measure progress over time, which would otherwise be too complex to manage. However, the company is aware that successful roll out of the application critically depends on other non-digital factors, too. This includes availability and quality of planting material and other required inputs, as well as the quality of service providers who can work with the farmers to offer the right levels of competence and empathy to create successful relationships.

Mars is about to pilot the application with farmers in Indonesia, Ghana and Côte d’Ivoire before further roll out in Ecuador. The process starts with a team of a technician - an experienced agronomist - and a community expert who undertake an initial assessment of the farmer's livelihood, farming, and income context. Based on the data gathered, the application then generates different farm development options with agronomic and agro-economic details over the full period it would take for the interventions to mature, which form the basis to jointly determine the most suitable option for the farmer. Over the course of the renovation process, which, depending on the farmer's investment capacity, can take between six to 15 years, the technician conducts annual visits to oversee implementation and a coach undertakes additional regular visits at critical intervals. Farmers do not have to contribute to the costs of the technicians and coaches, or to the application itself, but need to cover all inputs and other required labor costs.

Once farmers reach the final stages of farm development, where the whole farm produces the desired yields of 2 MT/hectare in Indonesia and Latin America, and 1.5 MT/hectare in West Africa, Mars expects farmers’ income levels in West Africa to have doubled from 2,000 US\$/year on 2 hectares of cocoa with yield of 400 kg/ha, to 4,000 US\$/year with yield of 1,500 kg/ha. At a farm gate price of US\$ 2,000/MT, this exceeds the benchmark of US\$2/day per member of household. In Indonesia and Latin America incomes are expected to triple from 2,000 US\$/year on 2 hectares of cocoa with yields of 600 kg/ha to 6,000 US\$/year on 2 hectares of cocoa with yields of 2,000 kg/ha.

Going forward, Mars is working on adding additional modules for the application, including one on financing, which aims to facilitate access to finance by generating income projections and serving as a monitoring tool for banks showing what must happen when to ensure success and repayment capacity.

Mobile payments and other financial services

Digital solutions also offer various opportunities to create greater access to financial services for farmers by expanding mobile financial services to rural areas. Digital finance solutions can be used to facilitate loan/insurance disbursements and payments. Replacing cash payments with digital payments through mobile money platforms, for instance, not only increases safety for companies and farmers through efficient and transparent processing of advances and payments, but also enables farmers to build financial track records through data collected required to obtain loans or insurance services. And once a robust ecosystem of cash-in/cash-out agents and merchants is set up, farmers can use their e-wallet to pay for other services and sectors such as mobile banking, electricity, health, and others.

Practical examples of mobile payment solutions

Mobile payments are a key module of the **Connected Farmer Alliance**⁷, a public-private partnership between USAID, Vodafone, and TechnoServe. The platform is a multifunctional, mobile- and web-based supply-chain management system that integrates Vodafone's M-Pesa mobile money solution. It uses a business-to-business-to-customer (B2B2C) model, in which agribusinesses pay the mobile network operators a monthly service fee for each active registered farmer and for transaction charges, while farmers are only subject to the standard M-Pesa withdrawal charges. The benefit of this pricing model is that it does not rely on the low purchasing power of farmers. Benefits arising for agribusinesses from the mobile money component include decreased risks associated with cash transactions, and lower operational costs such as bank charges on cash withdrawals, security fees, fuel used for cash distribution, and staff time spent on these activities. Enhanced efficiency and improved safety and privacy are also among the key benefits reported by farmers.

SmartMoney⁸ is a mobile money company with experience developing mobile money solutions in Uganda and Tanzania. It is based on three business pillars: (1) free-of-charge P2P payments and savings; (2) free-of-charge rural merchant payments; and (3), agricultural value chain bulk payments. When starting its operations in 2012, the company had an exclusive focus on agricultural value chain payments. However, the team quickly recognized that agriculture companies can only introduce improved payment solutions if they not only benefit the agriculture company but, more importantly, provide direct benefit to the farmers themselves. As a result, SmartMoney has expanded its service offering from a basic payment solution for agriculture companies into a fully inclusive financial ecosystem referred to as "E-Village." The system addresses key savings and local payment needs of rural economic stakeholders, including rural households, farmers, small rural businesses, rural merchants, and large rural institutions (agriculture companies, schools, NGOs).

Takeaways

As service providers think through ways on how to optimize and scale service supply to farmers, ICT solutions can offer tangible benefits for both companies and farmers. Suitability of approaches is context specific, but building on existing examples there is a range of common issues that should be

⁷ Mocevičiute and Babcock (2016) *Connected Farmer Alliance, Assessing the impact of a commercial mobile agriculture (mAgri) solution*. Technoserve, available at <http://www.technoserve.org/files/downloads/case-study-connected-farmer-alliance.pdf>.

⁸ For further information see <http://www.smartmoneyinternational.com>.

considered to determine how effective an idea, tool or model might be:

- Identifying a scalable revenue model
- Understanding requirements and pathways for scaling
- Determining necessary factors in the enabling environment
- Setting up systems to measure progress and results