



ICT-ENABLED OUTGROWING OPERATIONS: HIGHLIGHTS FROM AFRICA

INTRODUCTION

This is one of a series of briefing papers developed by USAID's FACET project to help USAID missions and their implementing partners in sub-Saharan Africa to promote information and communication technologies (ICT) within their agriculture-related development programs, including Feed the Future.

This briefing paper presents the results of an assessment carried out to identify, document and disseminate information about ICTs that are being used by African agribusiness companies to improve the management of outgrowing operations and the various forms of support they provide to farmers.

There are a variety of emerging ICT applications—many profiled in this paper—that can make outgrowing operations more efficient and increase the ability of companies engaged in outgrowing to support the farmers they source from with seeds, fertilizers, training, market access, and technical support.

The assessment was carried out between June and September 2012. After carrying out preliminary research, the team conducted field visits to Kenya, Zambia, Ghana and Tanzania to interview companies engaged in outgrowing operations. This resulted in the identification of a number of ICT applications being used by these companies to improve their operations and provide benefits to the farmers from whom they buy.

The paper begins with an introduction to outgrowing and the benefits for agribusiness companies to incorporate ICT into their outgrowing operations—especially for integrating smallholders. This is followed by a description of selected ICT applications that agribusinesses are using to make their outgrowing operations more efficient.¹ Finally, the paper discusses the implications of these applications for USAID missions and development practitioners.

OUTGROWING OPERATIONS

Outgrowing operations can be defined as an agreement (verbal or written) between farmers and companies for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. The arrangement also invariably involves the purchaser in providing a degree of production support through, for example, the supply of inputs or the provision of technical advice. Outgrowing operations are based on: 1) a commitment of the farmer to provide a specific commodity in quantities and at quality standards determined by the purchaser; and 2) a commitment of the company to support the farmer's production and to purchase the commodity.

Outgrowing can be instrumental in aggregating the production of small scale producers so they can

¹ Brief profiles of each application mentioned in this paper are available online at: <https://communities.usaidallnet.gov/ictforag/document-library/ict-and-ag-profiles>

participate in larger, more demanding (and otherwise inaccessible) domestic and international markets. Outgrowing benefits producers through the improved inputs, technology and technical assistance that companies (buyers) operating such schemes provide them. They also can assist donor programs promoting this strategy to achieve their goals of pro-poor economic growth—ensuring smallholders are linked into growth opportunities created as competitiveness is advanced. There is a strong rationale for donor programs to promote such operations in situations where mutually beneficial relationships are possible and where it makes economic sense.

INCORPORATING ICT

Implementing a successful outgrowing operation with smallholders presents a unique set of challenges for companies, including time and resource-intensive extension needs; managing large amounts of data; farmer demands for production credit; maintaining farmer loyalty and quality communication channels; and scaling up a commercially viable model. Fortunately, technological advancements in software applications and products designed for emerging markets, combined with a revolution in mobile phone coverage and rural uptake across Africa, has created a favorable environment for modernized, more efficient models of 'ICT-enabled' outgrowing to emerge.

Agribusiness companies engaged in outgrowing in Africa are increasingly using a variety of ICT applications to improve efficiencies as well as the support they provide to farmer outgrowers. Many of these examples are highlighted below. Technology is allowing companies, for example, to improve production planning, increase product traceability, and manage payments to farmers. Many of these applications are now being used by companies in a commercially viable and sustainable manner, independent of donor support.

Existing ICT—both simple and complex, customized and ‘off the shelf’—can now be integrated into many daily operational components of successful outgrowing operations such as: communicating with outgrowers, providing technical assistance, providing credit, ensuring outgrower access to appropriate inputs, determining prices for outgrower produce, procuring from outgrowers, developing seed programs, developing demonstration and trial plots, engendering farmer loyalty, and management information systems. ICT applications can help reduce transaction costs and create positive impact for both companies and producers—as well as others involved in the system (e.g. input suppliers, financial institutions, etc).

Reality Check: Bringing Staff Along for the Ride

“Technology itself is very easy. What is more difficult is behavior change. This has been especially true amongst our own staff, who are used to doing things ‘how it has been done’. This has been a challenge in transferring to a digitized ‘weigh and pay’ system.”

– *Managing Director of an agribusiness company with outgrowing operation.*

ICT APPLICATIONS IN OUTGROWING: HIGHLIGHTS

This section highlights some of the ICT applications being used by agribusiness companies engaged in outgrowing operations interviewed for this paper. They include:

- Direct deposits for payments to farmers
- Integrated GPS and GIS
- SMS-based database systems for procurement planning
- Soil testing to improve outgrower revenues
- Automated bulk voice messaging with feedback loop
- Electronic vouchers to facilitate farmer payments and reduce cash transactions
- Bulk SMS and radio programs to improve direct communications
- Supply chain management software
- Input tracking systems using barcodes
- Traceability and quality assurance software
- Mobile farmer education networks

Direct Deposits for Payments to Farmers:

In Zambia, the dairy company [Parmalat](#) utilizes direct deposits to monitor and manage its milk collection system. Traditionally, Parmalat representatives corresponded with and paid local milk collection centers, which were then expected to pay the individual farmers for the milk. With the new direct deposit system, the milk collection centers compile the quantity and quality of milk provided by individual farmers. That information is manually transferred into a database by Parmalat where it is reviewed monthly and used to calculate payments which are deposited directly to the bank accounts of farmers.

Payments to a large network of suppliers via direct electronic deposits can improve the ability of a company to track, monitor, and administer its procurement. Direct

supplier payments can also build trust and social capital between the company and its network of contracted farmers and producers.

Integrated GPS and GIS: [Geo-Traceability](#), a private agribusiness technology company, uses GPS mapping—integrated into a customized GIS—to maximize a client’s value in responding to traceability demands in the marketplace. In Ghana, they are mapping tens of thousands of cocoa and cotton farmers for Armajaro using handheld Garmins, feeding this information into a customized GIS for employees (and a simplified web-based platform for clients). Each farmer receives a unique farmer code, linked to his/her cocoa certification ID, and trained field surveyors administer a field based questionnaire, capturing information such as pesticide use, land tenure, date of plantation establishment, and key infrastructure. To speed data entry and reduce errors, paper questionnaires are scannable.

Although mapping is often driven by end market demands for traceability, when linked to a GIS it can provide the data and technology platform basis for a range of efficiencies and complementary applications. For Armajaro, this includes improved traceability capability, more effective geographic targeting of infrastructure or social/ health programs important for certified cocoa systems, and production planning efficiencies realized from accurate data on farm sizes and locations. For example, using this information, Armajaro can quickly determine which cocoa plantations are the oldest to prioritize replanting efforts.

SMS-based Database Systems for Procurement Planning: A large Kenyan green bean exporter (who wished to remain anonymous) has made significant improvements to

procurement planning by using a custom built database system combined with SMS messaging. The company's network of rural village-based coordinators gathers farming data detailing the location and status of green bean production of several thousand growers. The coordinators then submit the data to a central location through SMS messages where it is automatically entered into a database which generates reports describing overall production. As a result of this system, more accurate planning can be done to procure produce from farmers, process the green beans, and export the final product.

The increased efficiency and reduced costs allowed by this system has also improved relationships with outgrowers as better understanding of the timing and volume of production enables the export company to purchase the farmers' entire crop—providing more consistent and increased incomes. The company has improved their entire procurement process and believes the system has more than paid for itself through their ability to better meet export orders.

Soil Testing to Improve Outgrower Revenues: [Crop Nutrition](#) is a Kenyan agribusiness company that provides professional soil testing and fertilizer advisory services for both smallholder farmers and companies with outgrowing operations. It uses mobile technologies to expand the reach and efficiency of its services. Farmers submit soil specimen bags (provided by Crop Nutrition) to a representative who then forwards the specimen to a lab for analysis. Once the analysis has been completed, the results are sent directly to the farmer via SMS. This process reduces costs and dramatically speeds up the transfer of information to the farmers, who can

then use that information to improve their soil and crop qualities.

Crop Nutrition's lab reports include technical recommendations that advise farmers how to apply the correct fertilizers, lime or other inputs to reduce production costs and improve yields. This contributes to greater yields, improved quality and increased income for farmers. By encouraging all of their farmers to use this service, outgrowers can benefit from improved farm produce quality and increased product value.

Automated Bulk Voice Messaging with Feedback Loop: Hekimax's [MojaCast](#) is an interactive, bulk voice messaging product that allows the user to send customized, pre-recorded voice messages to large numbers of recipients, with question and answer response capabilities (e.g. 'press 1 for yes; 2 for no'), and receive statistics back to facilitate information management. In Ghana, it is being piloted to allow nucleus farmers/traders to communicate more efficiently and effectively with thousands of farmers. Voice messages may range from information on a trader's price, reminders on application times for agro-chemicals or key production practices, or to coordinate delivery days and times. The nucleus farmer/trader records the message in any language as an MP3 which is sent to Hekimax for bulk delivery. In Ghana, MojaCast has primarily been marketed to financial clients as a commercial product. Its use in agriculture—piloted in 2012—is currently provided free as a philanthropic effort, although as demand increases the business model is in place to transition to more commercial terms.

By automating certain communication needs, these types of products create significant time and cost efficiencies for aggregators, who no longer need to call farmers individually, travel as

frequently, or rely on word of mouth. Because Hekimax compiles results of recipient responses, this has many of the same benefits of a simple information management system.

Electronic Vouchers to Facilitate Farmer Payments and Reduce Cash Transactions:

Several Zambian companies such as [Dunavant](#), the country's largest cotton company, are using an electronic voucher system run by [Zoono](#) (formerly Mobile Transactions Zambia Ltd). With the e-voucher system Dunavant can pay its outgrowers with an e-voucher in lieu of cash. Dunavant deposits the full

Digitizing "Weigh and Pay"

Functions: Utilizing digital scales at collection points is an investment, but can lay the foundation for other efficiencies, especially when linked to a data management system.

Illovo Sugar uses digital weigh-bridges and a customized GIS to implement a complex digitized cane payment system for its 8,000 small-scale outgrowers in Tanzania. Illovo can weigh heavy truck deliveries of cane accurately by farmer code and capture both tonnage and quality grade for a more differentiated price. Illovo now pays 60% (and counting) of its farmers directly through an automated process, deducting for association fees and credits for transport and labor. Data is imported into an Excel file with credits/debits by farmer code, which is sent to the bank. Each farmer gets an itemized account printout.

Tanga Fresh is piloting digital scales at two milk collection centers in Tanzania and uses AgriManagr (see below) to capture and manage data. Farmers now get paid for portions of a liter and TF gets farmer-level delivery data from each location. Milk can be weighed en masse instead of in multiple buckets, which increases quality. At scale, TF plans to pay farmers directly and by quality grade, instead of weight.

value of e-vouchers it issues into its registered Zoono account which can be immediately transferred upon redemption by the farmers. The farmers can use the e-vouchers to purchase inputs at a discount at participating retailers or, if they choose, can even redeem them for cash, merchandise, or other services such as school fees.

Using e-vouchers improves the ability of a company to track, monitor, and administer payments to a large network of suppliers. The risk and security concerns of numerous cash payments by company staff in remote rural areas is also reduced through the use of e-vouchers. Farmer registration also enables the company to build a database of its suppliers to disseminate and compile information via mobile phones. Participating retailers benefit by expanding customer payment options and accepting payment e-vouchers in lieu of cash. Instant payment for e-voucher redemptions, via their Zoono accounts, further reduces retailer risk.

Bulk SMS & Radio Programs to Improve Direct Communication: [Tanga Fresh](#) (TF), a dairy company in Tanzania with 3,500 outgrowers, uses bulk SMS and weekly radio programs to improve the quality of extension and marketing messaging delivered to farmers and to build a direct connection between the farmers and the company. Using MyPhoneExplorer, TF sends bulk SMSs to 2,500 farmers weekly, communicating extension information and announcing disease outbreaks and price alerts. Farmers can text back questions or complaints directly to a full-time TF employee who handles approximately 500 messages each week. A short radio program, aired on weekends, is developed by TF and includes messages on milk extension, interviews with a range of dairy stakeholders, a “meet the Tanga

Fresh staff” feature, and listener call-in, where farmers can ask questions, get answers, and share experiences.

TF does not have company extension officers, so these initiatives serve that key function. Before, outgrowers were dependent on government extension officers or cooperative advisors; now, outgrowers have improved information and can communicate directly with TF. This allows TF to control the quality and timeliness of communications, to be more responsive to the needs of its outgrowers, and improves transparency within the dairy cooperative structure. TF has seen the quality of milk increase along with its credibility amongst farmers.

Embracing ICT in P4P

WFP’s Purchase for Progress (P4P) engages in formal marketing arrangements with farmer associations that often mirror a traditional outgrowing relationship. In **Ghana**, P4P recently transitioned from paying farmers via check to using [E-Zwich](#), an electronic smart card developed by the Bank of Ghana that allows users (authenticated by fingerprints) access to a network of banks and rural outposts and e-payment/savings. Through E-Zwich, P4P pays farmers individually based on volume delivered. Payment is routed to the association, then automatically transferred to farmers based on their E-Zwich code. In addition to reducing theft and increased convenience for both parties, P4P expects E-Zwich to encourage savings, as farmers can now leave money in the bank instead of cashing the entire check. Though not a commercial enterprise the WFP’s use of E-Zwich shows promise with the private sector as well. In **Tanzania**, P4P is working with USAID’s Connected Farmer Alliance to pilot supply chain management software with its 13,000 outgrowers.

Supply Chain Management

Software: Supply chain management software tailored to agribusinesses in African markets is beginning to emerge. For example, Vodafone currently has several products under pilot in East Africa,² [mFarms](#) in Ghana has products in development, and the Syngenta Foundation is launching [FarmForce](#) across Africa as a commercially available, largely off-the-shelf product that runs on an Android device (for field-level data entry) with a cloud-based server (for back-end management and data analysis). Roll outs in 2013 within outgrowing will include rice clients in Burkina Faso, Ivory Coast, and Ghana; potato processing and vegetable export clients in Kenya; and a cassava client in Mozambique. FarmForce is currently available in French and English with Portuguese in development.

In addition, Kenyan software development company VirtualCity offers [AgriManagr](#), which is currently active in Kenya and Tanzania. AgriManagr automates the procurement of agricultural products purchased from farmers. By measuring and recording the procurement process from weighing the produce to tracking transportation and payments, the software is helpful to all value chain shareholders. Cost savings through increased operational efficiencies can offset the price of the software in most situations.

² In partnership with Vodafone, USAID recently launched the [Connected Farmer Alliance](#). Through the initiative, Vodafone will develop supply chain management technology solutions for agribusinesses, with three pilots planned for 2013: sorghum and horticulture in Kenya; concession cotton farming in Mozambique; WFP P4P in Tanzania. Other Alliance initiatives include m-finance research and product development for smallholders and a Safaricom business incubator for ICT developers.

Companies using AgriManagr (and similar software) benefit from improved inventory management and reduced administrative costs, as well as access to real-time information about the status of their supply chain. Results from existing users have shown reduced weighing time at the farm gate and a reduction of up to two months in the time it takes to pay farmers. In addition, farmers receive a balance sheet and record of all their transactions, which can be used as proof of income to banks or other institutions. The system also allows companies to evaluate the performance of farmers and provide loyalty incentives or rewards to top performers. Furthermore, the system allows exporters to easily match a product to a digital record of when and where it originated.

Input Tracking Systems Using

Barcodes: In Ghana, [Armajaro](#) is using the barcode traceability technology they regularly employ to track cocoa beans in order to more effectively track and manage input distribution and usage amongst its cotton farmers. When inputs are distributed on credit, the receipt now includes a barcode, scanned using a handheld device, which includes information such as the individual farmer code and the volume of inputs. This is linked to Armajaro's overall database system and eases the information burden of tracking and calculating farmer credit. When Armajaro's field extensionists visit farms, they SMS the farmer code along with an input-specific usage code (e.g. that indicates that 'seeds have been planted' or 'NPK has not been applied'). The SMS codes are automatically incorporated into that farmer's data in the GIS.

Although the initiative is new, it is expected to significantly increase efficiencies in input management and tracking, improve transparency, and reduce misuse. Using the SMS feedback from extension agents,

production managers, for example, can know how many farmers have not applied a key fertilizer and are likely to have reduced yields during harvest season. In the future, Armajaro plans to release 'farmer supplier cards' that would give farmers more direct access to their data. Farmers can then use this data to support collateral claims and to help establish credit histories and commercial viability.

Traceability and Quality

Assurance Software: [Muddy Boots](#) is a UK-based software developer that focuses on traceability and quality assurance software solutions for agribusiness companies. Quickfire software, one of its products, helps companies track what their outgrowers are producing and where they are producing it. Greenlight Track and Trace is a packhouse management system which provides traceability back to the farmer, and their Cropwalker system records all aspects of the crop production cycle and utilizes mobile devices for recording data. These systems help track products, plan production, and create auditable reports to help improve operations and planning.

The improved traceability and record keeping systems provide agribusiness companies (such as Unilever) with access to audit data that has improved their procurement efficiency and increased their ability to provide traceability reports to buyers. The system also helps farmers ensure that their products are audited to export level standards.

Mobile Farmer Education

Networks: [CocoaLink](#) is an interactive farmer education and information delivery system being piloted by Hershey in Ghana to deliver extension and health education information to thousands of cocoa farmers, using mobile phone technology. Text messages—

covering production, post-harvest, and health messages—are sent to registered farmers' cell phones from a central service in Accra. Hershey has maximized the existing system of cocoa stakeholders by collaborating with the Ghana Cocoa Board (COCOBOD) to provide message content, Cocoa Research Institute of Ghana (CRIG) to diagnosis problems sent back by farmers via text or photo, and the World Cocoa Foundation to assist with mass farmer registration. Community trainers, selected in each of the 15 targeted communities, are each given a smartphone that they can use to take photos of crops, send them back to CRIG, and get a diagnosis (e.g. is this black pod disease?). Hershey partnered with DreamOval, a Ghanaian software firm to develop and manage the system architecture.

Farmers benefit from increased access to technical and health information, and ultimately increased incomes from more productive farms. Hershey estimates that yields of trained cocoa farmers are 15-40% higher. Since July 2011, over 100,000 messages have been delivered and Hershey aims to have 25,000 farmers enrolled by the end of 2012. In 2015, the initiative is designed to transfer completely to COCOBOD, the quasi-governmental institution that governs all cocoa buying in Ghana.

IMPLICATIONS FOR USAID AND DEVELOPMENT PRACTITIONERS

It is important to note that many of the applications described above are being used by companies independent of donor support. They are using them because they have commercial incentives to improve their operational efficiencies and the various kinds of support that they provide to farmers. In order to promote this kind of ownership and sustainability, donor programs need to make sure to engage companies in a participatory dialogue in which they

determine the ICT applications that make sense for them. Programs can then help to buy down the risk that companies face in developing and experimenting with these applications—but the responsibility for implementation should lie with the companies themselves.

One of the ways that donor programs can facilitate integration of ICTs is to invite agribusiness companies engaged in outgrowing (or thinking about establishing an outgrowing operation) to propose their own ideas and strategies for developing and integrating ICT into their operations. This can be facilitated, if needed, by presenting different ICT opportunities (as presented in this paper) to interested companies and/or by facilitating exposure visits for companies to see how ICT applications are being applied in outgrowing operations in other countries or locations. Ultimately, however, it is the companies themselves that need to decide which, if any, ICT application makes sense for them.

Once companies have identified, or become aware of, ICT opportunities the donor program can solicit their proposed ideas and strategies using a pre-determined application format referred to as an “Invitation for Application” (IFA). The IFA describes the donor program’s objective of encouraging agribusiness companies to invest in new ICTs that they might otherwise not invest in on their own or take a long time to do so (due to high investment costs and risks). It then presents the conditions of participation in the program and describes the kinds of technical and cost share support that can be provided to help companies “buy

down” the risk and cost of developing, experimenting, or implementing new ICTs.

Not all technology solutions are appropriate—scale of the outgrowing operation, buy-in of leadership, and strength of the net efficiencies that will be created from the change are all critical elements that need to be considered. For example, transitioning from cash payments to mobile money may be one of the easier solutions to adopt, but this may also require other changes, such as digitizing data collection or tracking sales by farmer instead of a producer group. In addition, both agribusiness companies and donor programs must be aware of access issues more marginalized farmers might face (e.g. collateral requirements to open a mobile banking account). Therefore, an important role for a donor program is to support companies to evaluate different products and promote those that can be most readily and realistically adopted.

ICT is often an overlooked supporting service market in value chain analysis. When assessing market systems and designing value chain development programs, programs should consider the role that third-part ICT providers can (or do) play as service providers to value chain actors. For example, projects may want to consider building the capacity of technology companies to understand, design around, and market to agricultural clients better.

DISCLAIMER

The views expressed in this publication do not necessarily reflect the views of the U.S. Agency for International Development or the U.S. Government.

CONCLUSION

ICT is a tool, not a panacea, and not all solutions fit all business models or contexts. Yet even small, ‘resource-lite’ technologies can yield significant returns for companies and farmers. Embracing technology can enable companies to take a smallholder-based outgrowing operation from the concept or small-scale stage to a commercially viable model. It can also help firms to transform inefficient and problematic operations into manageable ones.

With the explosion of mobile capabilities across Africa and renewed attention to the role technology can play in empowering farmers and “base of the pyramid” (BoP) consumers. There are many opportunities to adopt ICT applications, a vast number of which are already on the market but simply not being utilized in or adapted for agriculture. Technology can indeed be a powerful partner and catalyst in the effort to facilitate more inclusive, competitive, mutually profitable, and scalable outgrowing systems in modern-day Africa.

RESOURCES

Action for Enterprise, [Facilitating the Development of Outgrowing Operations: A Manual](#). (USAID, September 2009)

FAO, [Contract Farming Resource Centre](#).

World Bank, [Module 10: ICT Applications for Agribusiness Supply Chains, ICT in Ag Sourcebook](#). (2011)

Brief profiles of each application mentioned in this paper can also be found online at: <https://communities.usaidallnet.gov/ictfora/document-library/ict-and-ag-profiles>

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