



ICT APPLICATIONS FOR DISTRIBUTION AND SUPPLY CHAIN MANAGEMENT IN SUB-SAHARAN AFRICAN AGRICULTURE

INTRODUCTION

This briefing paper on ICT applications that support distribution and supply chain management is one of a series of papers to help USAID missions and implementing partners in sub-Saharan Africa use ICT more successfully to improve the impact of agriculture-related development projects, including Feed the Future (FTF) projects.¹

Using ICT to manage distribution and supply chains can increase efficiency and predictability and reduce waste in value chains and have positive impacts on all market actors. ICT applications presented in this paper are divided into the following categories: 1) applications that assist in the management of supplier networks, 2) applications that facilitate traceability, and 3) applications that assist input supply companies to manage their distribution networks.

TYPES OF ICT APPLICATIONS

I. Management of Supplier Networks. Large buyers often use ICT applications to manage their producer supply networks. Applications address record keeping, monitoring field agent activities, procurement operations, credit and payment tasks, input distribution, measuring productivity, and forecasting.² Buyers use a range of management information systems (MIS), from basic spreadsheets to complex software used

to track resources and facilitate the flow of information. Increasingly, they are using mobile phone based systems for the “channel” to reach the suppliers or their own field agents.

Examples of supply chain management ICT enabled applications include:

- Suguna Poultry, India’s pioneer in integrated poultry contract farming, uses Oracle’s Enterprise Resource Planning (ERP) software database system so its field agents can input data via Web sites on its contract growers’ operations. Information tracked and consolidated includes number of chickens delivered, feed delivered, mortality rates, and prices paid.³ Suguna Poultry has implemented ERP without donor involvement.
- Dunavant Zambia uses a supply chain management and electronic payment system that it developed jointly with IT company Mobile Transactions Zambia Limited (MTZL) to reduce transaction costs and improve information flows throughout its cotton supply chain, from input distribution to cotton gin inventory control.⁴ The system allows Dunavant to track output, timeliness and quality by individual smallholder farmers, allowing it to reward its best suppliers. The electronic payment system allows Dunavant to make payments to more than 70,000 cotton outgrowers.⁵ Dunavant’s buying agents can download information on loan amounts due by farmers before going to the field to collect cotton from farmers, allowing it to quickly calculate what is due to farmers and pay the correct amount on the spot, hence reducing “side selling” by farmers needing cash fast. PROFIT, a USAID-funded project, facilitated engaging MTZL to develop and implement these systems.
- EJAB Bangladesh, a potato production and processing company in Bangladesh, developed an MIS for its potato outgrowing operations using a combination of Excel worksheets and printed forms. Katalyst, a market development project funded by multiple donors, provided support.⁶
- OLAM, a global company that operates an integrated supply chain for 64 agricultural products in 20 countries, has sophisticated databases of their main suppliers of agricultural commodities with information on production levels, product quality, and input supply needs.
- Homegrown, a Kenyan agribusiness company with a network of more than 1,000 outgrowers, uses Quickfire, an audit management software created by ICT company Muddy Boots, to help its outgrowers meet export market standards by ensuring farms supplying the produce are all audited and certified.

Two additional examples of ICT applications to manage supplier networks are worth mentioning, though they are still in the development or early rollout phase.

¹ ICT means information and communications technologies including cell phone and Internet services, radio, and a wide range of digital devices and related tools including cameras, GIS, and a wide range of hand-held computing devices.

² Action for Enterprise, “[Facilitating the Development of Outgrowing Operations: A Manual.](#)” (August 2009)

³ Study conducted by Action for Enterprise in support of program design in India.

⁴ PROFIT Annual Report, FY2008

⁵ Mobile Transactions Blog, “[MTZL and NEXT year end highlights](#)” (December 2010)

⁶ http://www.katalyst.com.bd/op_Potato.php

- freshConnect - software developed by Indian IT company, Infosys, with USAID program support, is a suite of applications for handheld devices that allow supply chain participants to monitor and control back-end and front-end supply chain functions such as production planning and traceability. Several rounds of pilots of the software have taken place using high-end phones, and Infosys is modifying its original release to become available on low-end phones to suit commercial rollouts.⁷
- Esoko (formerly TradeNet) is a for-profit company that began in 2005 with some funding from USAID/West Africa's MISTOWA project. In addition to its short message service (SMS) "price alert" services, Esoko has just announced the roll out of a new offering called "Scout" to help large buyers to help them manage their suppliers.⁸

Meeting certain prerequisites can help sustain ICT applications for distribution and supply chain management: companies must have commercial incentives to use ICT applications to manage their supply or distribution networks, to trace products to their origin, and/or to decrease spoilage. As a result, companies and the producers with whom they do business benefit from increased efficiencies.

2. Traceability. Traceability refers to the recording of movements of products along the food chain from production to consumption (i.e., tracing products back to their source). For example, "relationship coffee" links coffee from its origin within a specific coffee cooperative and geographic location, increasing its retail price.

Across the globe, export standards are becoming more stringent. There is grow-

⁷ McCarthy, Steve, et al, "New ICT Solutions to Age-Old Problems: Case of the IGP India Project." (2009) and Interviews with Krish Kumar, Senior Technical Advisor for ICT with ACDI/VOCA.

⁸ Esoko website: <http://www.esoko.com>

ing demand among consumers to know where their food comes from. As a result, ICT solutions that allow companies to track goods from individual farms to retail shelf are increasingly available, using, among other technologies, tracking via cell phone systems, and bar codes. Examples of companies using or promoting ICT applications for traceability include:

- SourceTrace, an ICT solutions provider for agriculture, financial services, and health care in developing countries produces tracing software that works with standard mobile devices to track products, trace payments and automate records for traceability, certification, and agricultural processing. Clients include ECOM Agri-Industrial Corporation of Mexico and Costa Rica's Coopetarrazu (coffee growers).⁹
- Fruilema, a group of five Malian fruit and vegetable companies, worked with IT firm MANOBI of Senegal to develop software and personal digital assistant (PDA) technologies for mango producers and exporters to comply with GlobalGap certification. The International Institute for Communication and Development (IICD) supported development of the technology for Fruilema.¹⁰
- Ghanaian Pineapple Exporters use bar codes and geographic information system (GIS) technologies to track pineapples as they are transported from farms and collection sites to ports to move the pineapples out of the ports more quickly, limiting spoilage and ensuring compliance with GlobalGap certifications. TIPCEE, a USAID-funded project, facilitated development in conjunction with the Ghanaian export association.¹¹

⁹ SourceTrace website.

<http://www.sourcetrace.com/>

¹⁰ "IICD supported programme: Quality & FRUILEMA – Mali" (June 29, 2010)

¹¹ Ducker, Mike and Judy Payne, "Information Communication Technology as a Catalyst to Enterprise Competitiveness." (February 2010)

- Saco Systems of South Africa, a South African developer of radio frequency identification (RFID) solutions for traceability, serves the Klein Karoo Cooperative of South Africa, which uses RFID technology to tag its 100,000 ostriches with reusable RFID chips so that it can export according to European standards.¹²

3. Management of Distribution Networks. Input supply companies selling seed, fertilizer, and animal feed frequently use ICT to help manage their inventory and rural distribution networks. These applications include systems that process seed orders and invoice products electronically, control inventory and costs, communicate with clients, and identify new markets. Applications vary and range from simple spreadsheets to more sophisticated tailor-made applications.

One example of a software company providing ICT applications for input supply companies is Feed Management Systems (FMS). FMS provides Microsoft-based distribution management solutions that automate and optimize feed formulation, regulatory compliance, pricing, ordering and labeling of feed, inventory management, and risk management for small, medium, and large-sized feed supply companies in Asia, Africa, and the Middle East.¹³

Though in its infancy, there is currently research being done on using Global Positioning System (GPS) mapping technologies to help companies manage their distribution networks. The Rockefeller Foundation and Bill and Melinda Gates Foundation have funded an Agro-Dealer Strengthening Program in East Africa, one component of which is to support input suppliers to identify underserved markets using GIS and GPS maps. It is unclear at this point, however, how input suppliers will sustain this technology when the program closes (based on interviews with CNFA staff).

¹² "RFID technology tracks export birds." *The Journal for Security, Operations & Risk Management* (August 2005).

¹³ <http://www.feedsys.com/default.aspx>

LESSONS LEARNED

- Before promoting an ICT solution, companies and development organizations must be sure of demand for the solution from existing market actors and engage those market actors in developing the solutions from the start. As noted in the prerequisites, companies must also have commercial incentives to invest in the solution. Dunavant, for example, perceived potential cost-savings and efficiencies from the solutions that MTZL created and even purchased an equity stake in the ICT company once they realized how valuable the system was to them.
- Companies should conduct an assessment of external forces and risks that could potentially affect the viability of the solution. For example, if a company's uptake of a particular technology is premised on a strong market demand for their products, then an assessment of the market for those products should take place.
- All users of a given technology should be given appropriate training and capacity building to avoid delays in implementation. When a new database software system is first introduced, for example, all users must be properly trained in how to effectively enter data, track production, and run reports.
- An ICT solution has costs for operations, maintenance, and occasional upgrades. All costs need to be considered up front when gauging how much the system is worth to those benefiting—and how much they will pay for it. All too often such solutions begin during a donor project only to end at project close because no one anticipated how these operating expenses would be paid. Companies and development organiza-

tions also need to be aware of the enabling environment for certain technologies. For example, government regulation of RFID technology may limit its use.

- Using such systems in developing countries may require adaptations due to the cost or lack of availability of telecommunications services. For example, pineapple growers in Ghana can comply with traceability requirements by recording pineapples from origin to pallets in a packing shed in the field and simply transport that information to the port via a 'data stick' carried by the truck driver rather than transmitting it electronically. At the port, the data can easily be transferred into the international traceability system for the pineapples, tracking them onward from the port to their destinations in Europe.
- This set of applications are often financed and operated by large buyers, processors or exporters given how valuable they can be for them. USAID projects need to be especially cautious if heavy subsidies are requested by such large companies—it is likely to be a sign that the system has been designed in a way to outweigh its core value to these large companies.

LOOKING FORWARD

The use of technologies, such as ERP systems, bar coding, and electronic payment systems, are on the rise as companies seek ways to more efficiently and effectively track their supply and distribution chains and as consumers become more conscious and concerned about where their food comes from. The sophistication and uses of these technologies continue to increase; they can be very attractive solutions to address constraints in agricultural value chains. Nevertheless the most sophisticated solu-

tions are not always the most appropriate solutions. ICT can require considerable investment (in terms of time and cost). Development organizations can support market actors to think through their greatest challenges and what ICT applications, if any, are truly appropriate for the specific set of challenges they face.

RESOURCES

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

[PROFIT Annual Report](#), FY2008

Ducker, Mike and Judy Payne, "[Information Communication Technology as a Catalyst to Enterprise Competitiveness.](#)" (February 2010)

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