

Applying Mobile Technology to Improve Business Models in Tanzania and Zambia

This “FIELD Brief” is the twentieth in a series produced by the Financial Integration, Economic Leveraging and Broad-Based Dissemination (FIELD)-Support Program. This brief discusses how mobile technology can be used to improve business processes and supply chain management to reach more people and increase development outcomes. This FIELD Brief was written by **Chrissy Martin** and **Sashi Selvendran** from **Mennonite Economic Development Associates (MEDA)**.

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Mobile Technology for Service Delivery

Technology, specifically mobile technology, offers a new delivery channel that can improve the management of supply chains to distribute a variety of services, including health, finance, water, and education. There is an important distinction in this statement: technology is a delivery channel, not a solution in and of itself. While the use of technology can help to improve the delivery of services, it can only be effective if the entire business model for service delivery is sound. In other words, technology is only about 10% of a solution; the other 90% includes all of the design and operational management that is required of any commercial business model.

MEDA’s approach to technology-enabled development is to work with private-sector partners to design appropriate business models based on past experience with business solutions to poverty over the past 60 years, and then to ask whether mobile technology can offer a cost-effective, operationally-efficient, and secure way for partners to reach more people, faster—especially marginalized populations such as rural farmers, women, and youth.

Recent developments in branchless banking, mobile phones, and information technology have transformed the possibilities of delivering payments and other services to low-income households. Mobile phone usage astronomically grew in the developing world between 2005 and 2010, reaching about 80% of households. Seizing on this advancement, MEDA tested the potential to utilize mobile phone technology to improve upon its long history of supporting supply-chain management with the assumptions that a transparent electronic transaction infrastructure enables more efficient electronic delivery of subsidies and payments and offers cost-effective methods to reach remote populations.

This FIELD Brief illustrates the lessons learned through the application of technology to improve business models in two MEDA supported initiatives: mobile vouchers for agriculture in Zambia, and mobile vouchers for bed-net distribution in Tanzania. Both efforts demonstrated how supporting private sector partners to leverage mobile technology can create sustainable business models and products that reach the poor.



Some of the key lessons that are highlighted in these cases include:

1. Technology is a tool that can help to improve the delivery of services; however, it must be considered as one component integrated with many other processes, tools, and considerations as part of overall supply-chain management.
2. The integration of technology should be led by the experience of the end-user and by the business case for a local partner to drive long-term sustainability, rather than allowing the technology itself to drive the development of a product.
3. Partnerships between development organizations and private-sector partners, such as telecoms or agricultural suppliers, are critical and require internal implementation and training to ensure buy-in at all levels of each organization; partnerships created only at the management level are insufficient.
4. Technology has long-term benefits, but requires up-front investment and a longer time horizon in order to achieve a business case.

The results of integrating technology into the two projects outlined below are clear: better end-user experience, increased capacity to scale the delivery of goods and services, and better data for performance monitoring, evaluation, and design of future products or programs. This FIELD Brief is informed through observations and experiences of MEDA staff working directly with these projects over the past several years.

Case Study from Zambia: Mobile vouchers for Smallholder Farmers

Through the Technolinks project, funded by the Canadian Agency for International Development (CIDA), MEDA has worked directly with partner Zoono since 2011 to develop and pilot agricultural vouchers for smallholder farmers. Zoono, formerly Mobile Transactions, is an electronic-payments company based in Zambia which started in 2009 with support from USAID. The company has grown substantially over the past several years, securing a USD\$4 million investment in 2012 from Omidyar Network, ACCION Frontier Investments, and Sarona Asset Management. This growth occurred through experimentation, piloting, and scaling of products and services that work best for their customers, and which deliver on the company's promise to be “Easy, Quick, and Safe.”

One of the products that works for customers, e-voucher payments to smallholder farmers for agricultural goods (referred to as “ag vouchers”) was in fact very challenging during the design and pilot phase, and did not meet initial expectations for uptake. This was in large part due to the fact that the ag vouchers were introduced into the supply chain to replace an entirely cash-based system, and that electronic payments required sensitization and time in order for actors (e.g.: field staff, retailers, and smallholder farmers) to build trust in the new system and to understand the new processes and procedures.

The idea behind the use of e-vouchers within the cotton supply chain is simple. Agricultural buyers in Zambia—a largely commodity-based economy—are purchasing crops from smallholder farmers each year in cash. For the buyers, this means transporting large amounts of cash, which is difficult because it is: a) expensive, due to the cost of transport and



Fig 1. Users display cotton vouchers for farmers in Zambia.
Photocredit: MEDA

insurance; and b) risky, due to the chance of loss or theft.¹ In order to implement this new idea, Zoono partnered with Dunavant, a cotton company, that wanted a new way to deliver payments to smallholder farmers from whom they buy cotton each year.

Dunavant purchases cotton from smallholder farmers each year through a network of distributors, who pay the farmers in cash and transport the cotton back to Dunavant for processing. During this process, this company pays, on average, over 100,000 farmers in a season. In the 2011-2012 growing season they disbursed 130 billion kwacha or USD\$38 million to farmers over 3-4 months. To push this amount of money out in cash to farmers and distributors carries a large financial cost and a high amount of risk to the company. For cash-based payments, Dunavant has to recruit drivers and paymasters, pay for fuel, and maintain a network of paypoints, in addition to hiring seasonal staff to support cash distribution. This process creates a high risk of leakage, since cash payments are not always accounted for correctly. As a result of this risk, the company has needed to develop time-consuming and costly strategies, such as disbursing cash in multiple payments, in order to protect against theft and loss.

For the farmers, cash payments do not support financial management and make it difficult to save for future spending needs, including inputs such as seed and machinery. Interviews with local farmers conducted during a MEDA assessment show that cash payments sometimes resulted in unnecessary purchases that did not benefit the wider household, whereas the ag voucher led farmers to target spending on agricultural investment needs (such as seeds and other inputs). In addition, vouchers can be replaced if lost, or in the words of one farmer, "Even when you drop it, it's still safe."²

Zoono and MEDA together experimented in the initial design phase with multiple methods for delivering these payments. The partners first tested sending payments directly to a mobile wallet, an account held by each individual farmer. However, because all farmers do not own mobile phone, and many are not literate, this proved to be simply too difficult: introducing a new payment method and a new technology at the same time was too foreign to convince farmers. Therefore, the partners decided on a voucher delivered through a scratch card. Each scratch card has a unique number, which farmers can use to redeem a certain amount of value electronically at a nearby retailer to purchase agricultural supplies at a discounted rate. The scratch card works because the farmers understand and trust it as a way to communicate monetary value: they already use scratch cards on a regular basis to purchase airtime, or for those without cell phones, they are aware that neighbors and families do so.



Figure 2. The Voucher Model tested by Zoono and Dunavant in Zambia.

¹ In addition to challenges associated with a wide geographic dispersion of farmers and a lack of reliable roads, agricultural buyers were required to hire substantial security for the delivery of these payments, making cash payments very expensive.

² For the full detailed case study and many client stories from analysis conducted by Jillian Baker and Jennifer Ferreri of MEDA, in cooperation with Zoono staff, visit www.branchlessbanking.co.

Once the initial design had been tested, Dunavant's buyers began, in 2011, to offer farmers the option to receive vouchers in the place of cash as payment for their crops. There were two incentives: first, a 2-7% discount at participating retail outlets, and second, a way to safely store money intended for specific agricultural supplies in order to ensure that money is not lost or diverted to other uses. Retailers were convinced to provide discounts for certain products based on the potential that ag vouchers would guarantee demand for their agricultural inputs and provide cross-selling opportunities.³

Challenges

The initial results of the ag vouchers were, frankly, disappointing. Mid-way through the cotton buying season in 2011, MEDA and Zoono staff visited the field to understand why the number of vouchers marketed was far below the initial targets. The key challenges discovered were:

- **Operational Staff Training:** While Zoono and Dunavant management had agreed upon the processes and marketing messages, field distributors had not been properly involved in the design phase and therefore were not appropriately selling the product. After the in-progress monitoring trip occurred in the first pilot season, Zoono's sales force began to attend distributors' weekly meetings to explain the product in more details and provide an opportunity for questions.
- **Consumer education:** Neither Zoono nor Dunavant have the resources necessary to train all of the 150,000 smallholder farmers registered in their database. Dunavant, in fact, does not even buy directly from each farmer, but relies on the distributors/buyers, chosen from the most successful farmers, to buy from the smaller farmers. Therefore, it was clear that it was necessary to sell the product first to the distributors, and then to have them market to the smaller farmers through word of mouth. This process of marketing through informal consumer education was the best way to create the level of trust necessary to move away from cash. However, word of mouth takes time, and creating this trust clearly required more than one buying season before the vouchers would be adopted at scale.
- **Initial up-front investment:** Due to the fact this was a new product based on a relatively new concept—electronic funds in the place of cash, a trusted system—there were significant up-front costs in order to design, test, and educate farmers about the product. This type of investment for an untested product is nearly impossible for a private-sector company to justify to its board and/or shareholders. For this reason, Zoono benefited greatly from the support of organizations, including CIDA, USAID, and MEDA, which allowed the company to put sufficient time and resources into the testing and modification of the product. However, when Dunavant did not see instant cost savings, the future of the product was at risk. Through constant communication between partners, Dunavant chose to be patient through the first two buying seasons, which provided sufficient time to prove the concept and convince Dunavant not only to support the product but to take over full project management. From the design phase, Zoono hoped that the pilot phase would serve as a proof of concept in order to convince Dunavant and other private-sector partners to integrate the product into their normal business operations. In this way, transferring the project management to Dunavant was the ideal sign of success for the product, at this stage.

Benefits

After two years of testing and modification, in 2012 Dunavant issued 20,000 vouchers through Zoono. The product achieved this level of scale because the pilot convinced Dunavant of the benefits of the product, especially in terms of cost savings and risk mitigation. In addition, it provided Dunavant the flexibility to pay farmers at unexpected times, such as when Dunavant decided to pay bonuses to

³ No subsidy was or is provided to retailers.

farmers because of the lower-than-expected global cotton prices in 2012. Based on the results of the first two years, Dunavant took over the implementation of this project in 2013. In addition, the company has secured some additional financial support for monitoring of the program, which will help partners and future implementers to learn more as the product continues to scale.

The key benefits that convinced Zoono, MEDA, and Dunavant of the long-term viability of this technology-enabled payment delivery channel are:

- **Ability to scale:** For Dunavant, the incentive is to buy as much cotton from as many farmers as possible each year. In order to do this, they need both the ability to reach a lot of farmers efficiently, and to maintain farmer loyalty, since there are other competing cotton buyers in Zambia. Replacing cash with technology helps them to achieve both, by reducing fuel and transport costs, as well as the need for seasonal workers and the maintenance of the network of paypoints, as noted above. In the Southern Region of Zambia, the Dunavant Regional Manager reported 60% cost savings in making payments to farmers during the 2012 growing season.⁴
- **Client Benefits:** Those farmers using the ag vouchers report benefitting both from the retailer discount and from increased ability to manage money since most do not have access to formal savings accounts (less than 15% have a bank account) or other financial management tools. During the MEDA assessment, farmers interviewed identified the following benefits: security, ability to replace the voucher if lost (unlike cash), ability to plan ahead and budget, the ability to save, an increase in family unity due to transparency of electronic funds, better farm productivity, time savings, and preventing the diversion of income. The e-voucher product, in its current design, provides limited functionality in terms of financial management, but it is helping the farmers to gain trust in electronic money. The hope, which will be tested in the future, is that this introduction to e-money will help farmers more easily adopt sophisticated financial services, such as mobile wallets or commercial bank accounts in the future.⁵
- **Understanding of new client segment:** Now that Zoono has designed one product for smallholder farmers, they have a better understanding of how they can continue to serve this client segment in the future, with more products designed specifically to meet their needs and building off of the trust that has been established in the system, as described above.

“[The] most significant change in my life since the trade cards has been in my thinking...I am now thinking at a higher level, planning for the future. [It] prevents me from misusing cash since I don't have patience with money and helps me plan for his family properly instead of spending the money on myself.”

- Albert Chilale, December 2012

Case Study from Tanzania: Electronic Vouchers for Bed Nets

In Tanzania, the government utilizes subsidies to encourage pregnant women to purchase bednets, thereby reducing maternal and infant mortality rates. However, the supply chain of bednet distributors, suppliers, and retailers requires ardent oversight to ensure the timely and efficient delivery of products, especially to more remote parts of the country. USAID and the Global Fund supported MEDA in the delivery of these subsidies through a program known as the Tanzania National Voucher Scheme (TNVS). The TNVS, known to the public as *Hati Punguzo* ("discount voucher" in Swahili), was initiated in 2004 by the Ministry of Health and Social Welfare (MoHSW) under the National Malaria Control Program (NMCP). The subsidy has helped to ensure widespread distribution of long-lasting insecticide-treated

⁴ Interview with Moses Kambwambwa, December 2012.

⁵ This is also contingent on many other factors mentioned previously, mainly limited cell phone ownership, literacy, and bank penetration amongst the targeted smallholder farmers.

nets (LLINs) to pregnant women and infant children. By the end of 2011, Tanzania had achieved bednet coverage rates exceeding 80% nationwide through TNVS and another mass LLIN distribution campaign. Today, the program redeems about 1.5 million vouchers per year at an annual cost of about USD\$11 million.

Ensuring the continuous distribution of LLINs to support the overall supply chain requires a more efficient way to reach vulnerable populations and increase the speed of redemption. MEDA, and its in-house Technology Design Team, introduced the use of mobile phones and texting, rather than paper "notes," to issue and redeem these vouchers to qualified bednet consumers.⁶ The paper notes take, on average, 257 days from the time of issuance to the time of reconciliation and payment to the manufacturer. It was hoped the eVoucher would: 1) improve voucher liability management; 2) improve visibility in the supply chain; and 3) increase the speed of redemption. The long-term goal is to provide an effective and transparent mechanism to reach the target population and directly adjust the subsidy in response to market demand without time-consuming manual changes. Figure 3 below presents a comparison of the paper versus eVoucher workflows.

The eVoucher Workflow:

The eVoucher aims to use mobile phones and messaging to replace the role of the paper voucher in the existing TNVS voucher supply chain.

The eVoucher workflow, as indicated in Figure 3, includes:

1. Beneficiary visits a health clinic.
2. Clinic staff issue a voucher ID on the consumer's health card
 - ✓ Voucher requested and delivered to the clinic staff via an SMS
3. Consumer visits a TNVS retailer along with their health card
4. Retailer redeems the voucher
 - ✓ Voucher ID validity confirmed and transaction recorded via SMS sent by Retailer
5. Bednet supplier provides new replacement LLINs to the retailer in exchange for proof of voucher transaction (net barcode, eVoucher confirmation number).

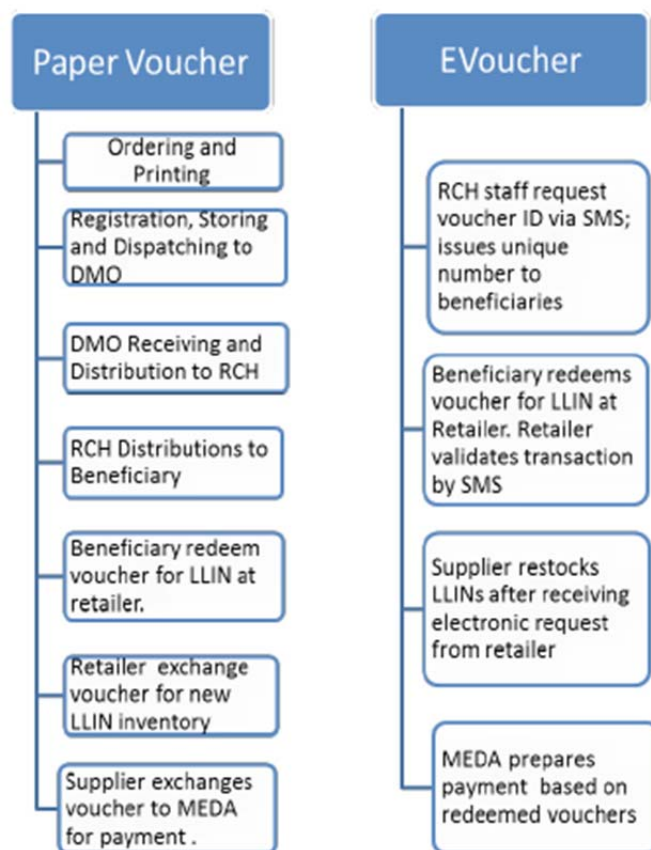


Figure 3. Process flow comparison*

⁶ The eVoucher technical platform was built and is maintained by PeaceWorks, MEDA's in-house Technology Design team.

* RCH = Reproductive Child Health clinic; DMO = District Medical Officer.

Challenges

In the initial phases of the pilot, a few process obstacles were observed. These challenges were related to integration of the new technology into the existing business process and operations, rather than the technology itself, as discussed further below.

- **Delays to the End-User:** MEDA chose to be carrier agnostic, creating partnerships with Tanzania's three largest telecoms—Vodaphone, Tigo, and AirTel—to increase the reliability of the service in parts of Tanzania with sporadic mobile phone coverage. The delivery time of mobile phone texting between two different carriers, however, could take from 10 minutes up to 1 hour. As a result, MEDA implemented a "short code" (an example of a short code is dialing 911 to reach the local police department) to reduce the response time from the server. By moving from the traditional full-texting mechanism (which was attempted in the first months) to short code, this user-friendly process led to a nearly 700% jump in user adoption rates over early months, as health clinic workers found the short code texting to be more reliable and faster for accessing eVouchers for clients.
- **Consumer Education:** In applying a new technology to improve business processes, it is critical to consider the end-user throughout each step of the process. The adoption of eVouchers was influenced by the willingness of pregnant women to trust the new technology. Skillful marketing was required to create this trust in the new system. As the eVouchers—unlike paper vouchers—were not tangible certificates, MEDA launched a marketing scheme using posters targeted at pregnant women and mothers to remind them of the importance of requesting an eVoucher and redeeming the number for an LLIN. This enabled MEDA to influence behavior change among end-users without costly training.
- **Ensuring Data Quality:** MEDA's Technology Design team designed and tested the technology for possible data entry issues prior to the pilot and fully trained staff on proper technique, however the system of quality control was not fully implemented with the health clinic staff appropriately. As a result, while the execution of the business process proceeded according to plan, the management of data quality encountered many issues and raised many questions, such as who would monitor and check the data after it was entered and how would bad data be re-entered. The initial sets of data from the eVoucher pilot included a number of errors from the health clinic staff who were just learning how to use mobile phones and were not familiar with SMS messaging. This required significant cleaning, which was challenging, costly, and time-consuming. In response, MEDA set-up automatic error responses, as well as a hotline for clinic staff to call if they needed additional support. The data management system allowed MEDA to observe and better manage data entry, as well as target additional training to clinic staff who may struggle with the new technology.

Benefits

Once the initial pilot kinks were ironed out, the new eVouchers led to a number of benefits in the overall supply chain that soon resulted in more rapid uptake and increased coverage. As of early 2013, MEDA was distributing an average of over 70,000 eVouchers monthly and was operational in 12 regions across Tanzania. The eVoucher was meeting the expectations of both donors and health authorities as a result of lower liabilities and more secure systems, as well as reductions in LLIN stockouts at the retail level through better managed inventory. The eVoucher not only streamlined the business process of the TNVS voucher distribution, it reduced paperwork and simplified the process as shown in Figure 3 above. eVouchers reach more people faster and are easier to distribute than paper vouchers. Additional benefits include:

- **Improved Supply Chain Management:** Instead of an open window for the redemption of the paper vouchers, the eVouchers must be redeemed within 60 days. This expiration date results in a better flow of funding, as unredeemed vouchers are instantly available for re-issue. Additionally, the eVoucher allows project managers to observe transactions as they move between market actors—

pinpointing bottlenecks and more accurately alerting distributors to send nets when inventory is low.

- **Data, data, data:** The introduction of mobile phones made it easy to collect basic information on consumers and learn which clinics were most popular among various demographics, as well as gain a better understanding of which retailers sold the most merchandise. The field staff found that the data can be utilized for numerous purposes leading to unrealized cost benefits and time efficiencies.
- **Cost reduction:** MEDA estimates, at a minimum, initial operational cost savings of 7.5% from using the eVouchers compared to paper vouchers, once overall systems improvements are completed. Harmonization of the eVoucher information system with the commercial and logistics networks of LLIN suppliers is progressing and expected to eventually influence logistics networks and lower costs. Additional benefits are likely to be realized as the eVoucher increases coverage over the paper voucher.⁷

MEDA has invested its own resources to leverage the existing platform and build a mapping site to better understand the clients utilizing the eVoucher system. MEDA believes it may be possible to utilize this data to improve the process of issuing eVouchers (by identifying problems faster) and also offer other products and services to clients.

Conclusion

MEDA found that in both the cases of ZoonA and TNVS, technology could be utilized in the supply chain to realize process efficiencies, drive down costs, and increase coverage rapidly. However, the upfront time investment, the training and consumer education required, and business process management are critical pieces to designing a successful business model. This is similar to what we found when MEDA worked with USAID Mobile Solutions and NetHope in Uganda and Tanzania to understand how USAID implementing partners can benefit from mobile payments. Although these assessments were focused specifically on mobile financial services, the key message was the same: technology may take initial upfront investment in terms of money and staff time, but if well-planned, -implemented, and -managed, it can, in the long-run, be safer, less burdensome, and more cost-effective than alternatives. To see the results of these assessment and all of the tools that USAID has produced as part of its commitment to the Better than Cash Alliance (BTC Alliance) visit the NetHope Payments Innovation website.⁸

USAID will continue to build these types of tools, support the advancement of mobile solutions, and close the gaps that hold back access and uptake to technology through its FHI 360-led Mobile Solution Technical Assistance and Research (mSTAR) program, an Associate Award under the FIELD-Support LWA.⁹

In summary, the key lessons MEDA has recorded through working on the use of technology and mobile solutions for supply chain management are:

I. **Impact should be measured by the development outcome:**

MEDA has found that technology, rather than being an end, is a means to an end which is best utilized to enable existing market systems and commercial actors become self-sufficient and, thus, sustainable. In both cases described above, technology adaptations were designed to improve a business process to reach health and livelihood outcomes—in Zambia, farmers increased their ability to manage household finances and manage risk, while in Tanzania, improved supply chain

⁷ As of April 2013, both the paper and eVoucher are being used to distribute the subsidy.

⁸ <http://cloudportal.nethope.org/programs/payment-innovation>

⁹ More about mSTAR at www.microlinks.org/mstar

management meant faster services, and as a result, reduced infant and maternal mortality rates. Keeping the development outcome as the central focus of the technology solution is critical to limit the possibility of escalating costs and tangential outputs.

2. Design should be driven by the end-user:

Related to the first point, if the ultimate goal is achieving impact for targeted populations, then their experiences and needs should drive the design process. Simply designing a good software solution or technology product is not sufficient for widespread impact or usage. The most successful technology products are generally those that are built on solid, observation-based market research, tested, and continually modified based on user feedback. In both cases of ZoonA and TNVS, considering the smallholder farmers and pregnant women, respectively, was critical to the successful uptake of the eVoucher.

3. Good partnerships require both time and training:

The use of technology with a supply chain may seem intuitive for the designer and may be agreed upon at a managerial level, but it will require additional training and testing with field and operational staff in order to ensure understanding and buy-in at every level. Planning accordingly in the budget and workplan for such testing and training should reduce the risks of problems in the pilot, as well as secure institutional ownership from the field staff before launch. All stakeholders in the process must understand the overall objectives and strategy to fully "own" the process.

4. Cost benefits are realized over the long-term:

Initial investments in technology for social or human development purposes can often require a subsidy to prove the business model to private sector partners. In the case of ZoonA, Dunavant was able to see the value of the technology once the pilot helped them realize numerous benefits. The upfront cost and level of risk involved in innovation would likely not have been possible without the support of donor funds and technical support. Likewise, in Tanzania, with limited government funds for a public health issue, donor funds and MEDA technical support was essential to the design and testing of the eVoucher.

5. Implementation and integration of technology must allow for human error:

Many technology-based solutions encounter human error issues within their business process and operations. The challenge of the eVoucher is that process and operational activities are different than paper vouchers. Similar to other ICT solutions, the problem is not the technology or the application, but a) adoption by users; b) integration into new business process; and c) execution of the new business processes. Allowing time in a pilot for human error, conducting a thorough testing of the technology with field staff, and training users in every step of the supply chain should reduce the impact of these issues when a new system is introduced.

Trends toward electronic, financially-inclusive, payment systems are gaining popularity. The question of how donors, development practitioners, and governments can better leverage these trends to reach larger bands of the population and provide greater access to financial services demands further testing and examination. The cases provided here are just two examples of many that demonstrate the potential of introducing technology to improve a business process and achieve development outcomes. For additional reading on either of these cases, please visit Technolinks (<http://branchlessbanking.co/>) and TNVS (<http://medatanzania.org/>).