



WORKING PAPER

Digitizing Agricultural Payments

Lessons from Uganda's Coffee Value Chain

Amani M'Bale, Rashmi Pillai, and Nathan Were

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ACRONYMS AND INITIALIZATIONS

ARPU	Average Revenue Per User
BTCA	Better Than Cash Alliance
BTS	Base Transceiver Station
CI	Cash-In
CO	Cash-Out
DFS	Digital Financial Services
FSPs	Financial Services Providers
GDP	Gross Domestic Product
KCL	Kyagalanyi Coffee Limited
KYC	Know Your Customer
MM4P	Mobile Money for the Poor
P2P	Peer-to-Peer
PAYGo	Pay-As-You-Go
UNCDF	United Nations Capital Development Fund

I. EXECUTIVE SUMMARY

Coffee is an important cash crop for Uganda. It accounts for 20 percent of the country's export earnings and is a source of income for 2.8 million farmers (14 percent of the adult population).¹ In 2015, the United Nations Capital Development Fund's (UNCDF's) Mobile Money for the Poor (MM4P) team partnered with Kyagalanyi Coffee Limited (KCL), one of the largest coffee exporters in the country, to digitize payments to KCL's 6,000 certified farmers over the next two years (2016 and 2017). Three coffee cycles later,² KCL has yet to achieve 50 percent digital payment adoption across its farmers. Yet, KCL, MM4P, and MTN Uganda consider this project a big success because lessons learned from the project led MM4P, MTN, and other mobile network operators to invest in digitizing multiple agriculture value chains in the country, which, in turn, has led to financial inclusion for numerous rural, low-income populations.

MM4P learned that agriculture value chains are a long-term investment and may not necessarily fit typical project cycles. For example, a two- to three-year time frame is not likely to be long enough to digitize an agriculture value chain, especially if the value chain being targeted is in a rural and underserved area. It also learned that appropriate partnerships are critical components of the investment. Initially, there were only two partners—MTN and KCL. By the end of 2016, MM4P management realized that multiple partners were needed to make the initiative seamless. Today there are seven partners, including payment aggregator Yo! Uganda, solar company Fenix International, consulting firm Vital Wave, agent network manager Potbell Limited, and design firm IDEO.org.

Despite the initial skepticism, MTN Uganda's management came onboard as a partner mainly to test rural service penetration by digitizing the agriculture value chain. Once the telecom infrastructure challenges in the pilot sites of Kapchorwa and Manafwa were fixed, MTN management was surprised to learn that the base station in the area was not only making money, but that the GSM to mobile financial services conversion ratio (the rate at which subscribers opened mobile wallets) surpassed the national average by 25 percent. While only 16 percent of the revised target of 4,200 farmers signed up to voluntarily receive partial payments via mobile money, the larger community adopted MTN's GSM and mobile financial services. Of the targeted 24,108 customers (community and farmers included), 84 percent registered for MTN's telecom service, 53 percent of whom were 90-day active mobile money customers.

The success of this targeted rural adoption was achieved through an intervention by a digital financial services Booster Team run by Yo! Uganda. The Booster Team was expected to educate farmers and the larger community on mobile phone and mobile money use. It was also responsible for customer and agent registration and recruitment. This model resulted in the expansion of MTN's rural subscriber base in the test areas, which continue to bring in monthly revenues.

The investment needed for agriculture value chain digitization and its eventual success depend on context. MM4P invested around \$400,000, the majority of which funded the expenses of the Booster Team. The Bill & Melinda Gates Foundation financed the costs of Vital Wave and IDEO.org's services.

1 Assuming an adult population of 20 million, based on the year-over-year growth projections of the latest census (2014).

2 A coffee production cycle is 4–5 months—typically from November to February.

Donors, agricultural exporters, and implementers that are contemplating digitization of agriculture value chains will find “**Section VII. Hindsight Is 20/20**” particularly relevant. Along with the detailed challenges and solutions that emerged per coffee cycle

addressed in this paper, Section VII provides a nonprescriptive framework that these stakeholders can use to determine whether they should invest in digitization and the factors they should consider to help them make this decision.

II. CONTEXT

Formal financial services in Uganda grew by 386 percent in 2007–2013. This growth was largely fueled by mobile money.³ By 2014, 29 percent of the adult population actively used mobile money,⁴ and over a third had registered mobile wallets (FII 2014). However, growth was skewed toward users who were above the poverty line and who lived in urban areas. In 2014, only 22 percent of registered mobile money adults were in rural areas. Similarly, only 20 percent of users below the poverty line had registered for the service (FII 2014).

In 2014, United Nations Capital Development Fund’s (UNCDF’s) Mobile Money for the Poor (MM4P) Uganda program was engaged by the Bill & Melinda Gates Foundation to support the provision of digital financial services (DFS) to rural communities, and especially those who live on less than \$2 a day.

Agriculture is the foundation of Uganda’s economy. According to Anderson, Learch, and Gardner (2016), agriculture makes up 23 percent of gross domestic product (GDP). Over 80 percent of the population is directly or indirectly involved in agricultural activities. Smallholder farmers—those with land sizes up to 1.6 hectares—make up 85 percent of the Ugandan farming community.⁵ Seventy percent of these households live below the \$2.50 a day poverty line. (See Box 1.) When it comes to formal financial inclusion, smallholder farmers lag in their exposure to and use of financial services compared to the national average. Even today, eight years after the launch of mobile money in Uganda, smallholder farmers are below the national average in terms of formal finan-

cial inclusion, currently at 38 percent, by 12 percentage points.

Agricultural payment digitization, like any bulk payment, has the potential to incorporate large swathes of financially excluded people into the digital economy and provide them with access to an array of financial services. The Better Than Cash Alliance (BTCA) (2015) identifies three stages of shifts toward a cash-lite economy. The first shift begins when bulk payers in an economy, such as governments, large employers, agricultural exporters, and development aid distributors, decide to pay electronically. Digital payments afford payees electronic currency and create a data trail of formal financial history, which may then be leveraged to access financial services like savings, insurance, and credit.

The opportunity to shift how millions of people receive money—from cash to digital—thus bringing them into the formal financial fold, is why organizations like UNCDF and CGAP are excited about the potential of bulk digitization, particularly the digitization of agriculture value chains.

Kyagalanyi Coffee Limited (KCL) was the first agricultural company that UNCDF teamed up with to digitize downstream payments to farmers, traders, and staff. UNCDF is using what it learned from coffee value chains to support the digitization of other value chains, including that of dairy, tea, and maize. Each value chain is different and comes with its own challenges. This paper aims to share the journey of coffee value chain payment digitization in Uganda, which continues today.

³ See also, Finscope.

⁴ On a 90-day basis (FII 2014).

⁵ Twelve percent are medium-scale, and 3 percent are large-scale farmers.

BOX 1. Typical profile of a Kapchorwa coffee farmer

Paul has lived in Kapchorwa in eastern Uganda all his life, farming coffee on the land he inherited from his father. Today, he is a certified smallholder farmer that supplies coffee cherries to KCL.^a On a September 2015 trip to drop off his coffee cherries at KCL, Paul received approximately UGX16,000 (US\$4.60) for the drop-off. In an average year, he is among the 70 percent of Mt. Elgon coffee farmers in eastern Uganda who make less than \$2 a day.

Like 90 percent of smallholder farmers in Uganda, Paul does not own a bank account (Anderson, Leach, and Gardner 2016).

Certification standards mean Paul does not use harmful fertilizers or child labor in coffee production. The coffee Paul produces yields a higher price—both for him and for the coffee company that buys his product. **Certified farmers are sought after by coffee companies in Uganda, and companies compete to attract and retain these farmers.**

To harvest more coffee and make more income, Paul needs to invest in his business. Some of Paul's coffee trees are past their prime, and these trees yield less than half the amount that newer trees would produce. Replacing older trees is not financially feasible. Paul would have to give up a year's harvest from the old trees while the new trees mature and start to bear fruit.

Access to financial services—either the means to save for the investment or access to small loans to buy new trees—could help Paul overcome this hurdle. Building a credit history through digital payments could help Paul access the financial services he needs. When asked about formal financial services, Paul said he had no interest in opening a bank account—banks are expensive and far away. Despite never having used a phone on his own, Paul said that mobile money was the only way someone like him could hope to access such services.

a. To be certified, farmers must meet ecological, environmental, and fair work standards as directed by international certifying bodies, such as UTZ and the [Rainforest Alliance](#) (Perez 2016).

Digitizing agriculture value chains is extremely complex and replete with challenges.^{6,7} This paper focuses on a case study that illustrates the complexity and gradual success of digitizing the coffee value chain in Uganda. It identifies the various actors and their roles in digitizing payments between the buyer (KCL) and sellers (farmers and traders). It also highlights

the incentives for each stakeholder and addresses significant barriers to implementation that the MM4P team experienced, resulting in MM4P playing a far more extensive role than originally envisioned. This paper is written for donors, financial services providers (FSPs), and agricultural firms that are looking to digitize payments in the agriculture value chain.

6 See McKay and Buruku (2016).

7 See Mattern and Ramirez (2017).

It presents an analysis of agriculture value chain digitization through three lenses:

- Readiness of the market and the players involved in payment digitization.
- The value proposition that enables long-term investments by various private-sector players, including agricultural companies (exporters), FSPs, and others.
- Farmer uptake of DFS and digital payments.

Digitizing the KCL coffee value chain

In 2014, MM4P, which aims to increase digital financial inclusion in Uganda, undertook market research on the coffee, dairy, and fish value chains to identify opportunities to digitize payments to farmers. It sought to identify potential partners from the large payers within these sectors. It then offered these partners technical and financial support to modernize payments to drive financial inclusion among financially excluded rural poor communities. Large payers have an incentive to digitize payments because digitization drives transparency, increases accountability and efficiency, and reduces risk. It can also provide significant benefits to payees in terms of financial inclusion. However, because digitizing a payment stream is expensive, donor funding is often needed to bridge the gap even for the most dedicated large payers.

In April 2015, KCL became the first large agricultural exporter to partner with MM4P. **The goal of this partnership was to digitize payments to the company's approximately 6,000 individually certified coffee farmers in the Mount Elgon region of eastern Uganda** and to the 800–900 traders who sell coffee to the company. These traders jointly buy coffee from an estimated 45,000–50,000

individual farmers. (See Box 2.) Eventually, KCL hopes to extend payments to all 11,000 farmers nationwide with whom it has a direct relationship. KCL strives to help these farmers to sustainability improve both coffee yields and quality.

Coffee is the largest cash crop in the country and generates close to 20 percent of Uganda's export earnings. It is an important source of income for the 2.8 million farmers. In the coffee sector, over 95 percent of transactions are cash-based (Anderson, Leach, and Gardner 2016). To make payments to their staff and farmers, agriculture companies like KCL transport cash on a regular basis via back packs on taxis or *boda-bodas* (motorcycle taxis) across hundreds of kilometers. Both the mode of transportation used and the schedule often are widely known, putting those involved at risk of theft and assault.

Digitizing KCL payments via mobile money

Uganda is one of 19 markets that have more mobile money accounts than bank accounts (GSMA, State of the Industry reports, 2016 and 2017). Mobile money is the predominant financial service in Uganda, where 53 percent of the adult population has access to mobile money and 38 percent of adults have a registered mobile money account. Phone ownership—a commonly cited barrier to mobile money use—is over 55 percent nationally, and 78 percent of adults have access to phones.

Bank penetration among adults is low at 11 percent. Banks have limited reach beyond district and regional capitals and have no presence (i.e., branch or ATM) in some rural areas. While mobile money agent penetration is higher than bank penetration (there are 540 mobile money agents to 2.98 bank branches and 4.53 ATMs for every 100,000 adults),

BOX 2. Profile of KCL farmers

Uganda's coffee is produced by smallholder farmers. Although coffee is one of many crops grown, it is often the most important source of income. **Average yields in Uganda are estimated at about 10–12 bags of green coffee per hectare, making Uganda among the countries with the lowest coffee yields in the world.** Most Ugandan farmers grow 0.2–0.8 hectares of coffee per annum. Making a good living with such small plots and low yields is difficult.

KCL has over 6,000 certified farmers in the Mt. Elgon area who fit this profile. KCL has an active program to support its farmers and increase their earnings by delivering a range of services that help farmers increase yields and quality sustainably. These KLC programs are verified and certified by the Rain Forest Alliance, UTZ (Utz Kapeh), and 4C.

Despite these efforts to support the coffee farming community, over 70 percent of the coffee farmers in the Mt. Elgon area earn less than \$2 per day on coffee if the payments are assumed to spread over the full year before accounting for production expenses. Roughly 20 percent earn \$2–5 per day. Farmers in this area can sell other cash crops, but most report that coffee is their primary source of cash income.

As of the start of the 2016–2017 coffee season, just over half of the coffee farmers in Kapchorwa, the pilot site for coffee digitization, was known to have mobile phones. Although the majority of farmers who had phones reported using mobile money, this could not be independently verified.

Approximately 12 percent of KCL's registered farmers in the 2015–2016 coffee season were women. Women's average earnings are slightly below those of men, and they are more likely to earn less than \$2 per day. Where the real disparity lies is in the percentage of land devoted to coffee farming. Women devote over half of their acreage to coffee production while male farmers devote only about a quarter of their land to coffee. However, on average, women also own farms that are slightly less than half the size of their male counterparts, leading to questions about their ability to sustain their families in the off-season.

there are few mobile money agents in rural areas, and they are usually located in trading centers, which influences customer uptake. Additionally, rural agents that are located away from rebalancing points like banks or a super-agent often struggle with inadequate liquidity and network issues, which deter customers.

Among smallholder farmers in Uganda, only 10 percent personally own a bank account while 21 percent

own a mobile money account (Anderson, Learch, and Gardner 2016). Given these market characteristics, using mobile money as the medium to digitize payments seemed like the most logical option for KCL.

MM4P and KCL identified FSPs to implement the initiative, and MTN Uganda, the largest telecom provider in the country came onboard as a partner.⁸ Yo! Uganda, a payment aggregator,⁹

⁸ MTN and Airtel are the two largest MNOs in the Ugandan market and control over 95 percent of the mobile money market share. Unlike MTN, Airtel was not keen on partnering on the project at that time.

⁹ Aggregators enable the seamless collection, disbursement, and circulation of digital payments across multiple payment providers. See McKay and Pillai (2016).

was chosen through a bidding process. At the time of onboarding these financial services partners, the business case—cost and revenue drivers—for MTN and Yo! Uganda was not entirely clear. The only known was that it was a high-volume, low-margin business (high volume due to the frequency of various payments KCL made to staff,

vendors, traders, and farmers and low margin because the largest set of recipients was smallholder farmers who could not afford high fees). MM4P used various instruments—from providing grants to technical assistance and at one point even setting up a risk assurance facility—to support these partners.

III. THE KYAGALANYI COFFEE VALUE CHAIN

Business

KCL was founded in 1992 after the liberalization of the coffee sector. It is a member of ED&F MAN Volcafe Coffee Division, an agricultural commodities merchant, and has grown to be one of Uganda's largest companies in coffee procurement, processing, and exporting (Report Company 2015). KCL is responsible for over 16 percent of Uganda's coffee exports. Its goal is to purchase the best quality coffee and increase its procurement levels to be the preferred Ugandan supplier of medium and large roasters. In recent years Uganda exported approximately 3.5 million bags of coffee per annum; it currently ranks eighth on the list of largest coffee exporting nations (Szenthe 2017). KCL seeks to push the country's exports to 4 million bags, with a focus on increasing sales to its primary markets in the European Union.

Operational structure

Coffee is seasonal; in the Mt. Elgon area, the season runs from about July through February, depending on rainfall. During the season, KCL sources Arabica coffee in the Mt. Elgon area from certified farmers and from traders. KCL's purchasing process is described in the following and illustrated in Figure 1. See Box 3 for a short list of key terms used in the coffee industry, while Table 1 lists the main actors involved in the traditional mode of payment.

Mt. Elgon certified smallholder farmers¹⁰

KCL purchases coffee directly from approximately 6,000 certified smallholder farmers and pays them in cash upon

delivery. The smallholders live in remote rural areas. They deliver coffee, usually by carrying the coffee in bags on foot, to one of six KCL "washing stations." KCL staff at each washing station weigh the coffee that is brought in, calculate payment based on the weight and the day's price, and make the payment. During the high season, the washing stations can get very busy, and farmers wait hours to sell their coffee and get cash payments.

Payment values range from a few thousand shillings up to 10 million shillings.¹¹ KCL washing station staff travel up to 40 km several times a week to get UGX 50 million to UGX 70 million (approximately US\$14,200–20,000) in cash to make these payments. Certified smallholders are not obligated to sell their coffee to KCL. They can sell to any of the coffee companies in the area. Given the higher price that certified coffee yields in international markets, exporters are constantly competing for farmer loyalty and produce. KCL strives to provide services that are attractive to these farmers; the option of receiving digital payments is intended to benefit the farmers and is part of a strategy to increase their loyalty.

KCL's loyalty program is a profit-sharing scheme. Several months after the end of the season, farmers return to the washing station with copies of their paper sales receipts, and they receive a bonus based on the number of kilograms of coffee sold to the company. The profit-sharing payments are timed to coincide with the period between seasons when coffee farmers are typically running short of cash. KCL plans to eventually digitize this profit-sharing program as

¹⁰ Certified farmers are important for coffee companies, particularly companies that sell into markets, such as the European Union, where certified product yields a higher price. KCL works closely with these farmers and provides training and access to inputs that improve yields and quality. KCL provides training on sound agricultural practices and facilitates access to seedlings and other inputs at wholesale rates. (KCL does not, however, provide input credit to farmers.)

¹¹ 1 USD = 3500 UGX, 2015–2016 rates.

FIGURE 1. KCL business and operational structure

Mount Elgon Farmers

There are about 6,000 certified smallholder Arabica coffee farmers working in the Mount Elgon area for the Kyagalanyi Coffee Factory.



Washing Stations, Staff and Managers



Farmers walk to the washing station carrying coffee cherries. They're paid in cash by washing station staff.

The washing station staff and managers must go to Mbale for their salary and to fetch cash to pay the farmers. Managers can go to Mbale 2-4 times per week. They travel about 40km and are carrying anywhere from UGX 50M to 70M.

Traders and Transporters

Traders buy coffee cherries from about 50,000 farmers, and they pay those farmers in cash. Traders can be grouped by the number of farmers from which they purchase. Depending on the scale of trader, a few thousand shillings to UGX 50M must be on hand to pay farmers. Values are approximations.



Traders deliver coffee to the Kyagalanyi Coffee Factory in Mbale and are paid UGX 2M-50M by bank check. They must wait up to a full day for the bank transfer to clear; during this time, they must often sleep in Mbale. From the factory in Mbale, the coffee is transported to Nairobi for export. Transport staff are paid in cash.



BOX 3. Key Terms

Cherries. Raw unprocessed coffee where the coffee bean is enveloped by a hulk.

Parchment. A product of a process where the husk is removed from the raw coffee fruit of the [coffee plant](#) and the coffee bean is dried.

Washing Station. The coffee buyer location where coffee cherries are delivered by farmers for inspection and sale to the coffee buyer.

Certified Coffee. To become certified, farmers must meet ecological, environmental, and fair work standards as required by international certifying bodies, such as UTZ and the Rainforest Alliance.

TABLE 1. Key actors in the traditional mode of payment

Stakeholder	Purpose of payment	Payment method	Payer	Pain points
KCL	Coffee procurement	Cash/ Bank transfer	KCL	<ul style="list-style-type: none"> • Accountability of cash • Risk of cash-in-transit • Safety of employee/farmer/trader
6,000 certified smallholders	Coffee cherry purchase	Cash	KCL	<ul style="list-style-type: none"> • Risks of cash-in-transit • No access to financial services • No safe place to save • No confidentiality of funds
Traders (small, medium, and large)	Coffee purchase	Bank transfer	KCL	<ul style="list-style-type: none"> • Risks of cash-in-transit • Wait time for bank transfers
KCL washing station staff	Wages, coffee purchase	Cash	KCL	<ul style="list-style-type: none"> • Time and cost around travel to collect cash (in Mbale) • Risks of cash-in-transit • Accountability for KCL funds
Transporters	Exporting coffee to Nairobi	Cash	KCL	<ul style="list-style-type: none"> • Risks of cash-in-transit • Currency exchange
45,000–50,000 noncertified smallholders	Coffee cherry purchase	Cash	Small, medium, and large traders that source the coffee from these farmers	<ul style="list-style-type: none"> • Lack of a safe place to save • Lack of access to financial services • Lack of confidentiality of funds

well, so that those who register will not have to keep their receipts nor will they have to return to the washing station for their funds—the funds can be automatically paid via mobile money.

Payment digitization is voluntary

Farmers opt to receive their payments in cash, mobile money, or a combination of the two. Access to mobile money providers increases safety of funds and access to savings, lending, and other financial services.

Traders

KCL also purchases coffee from 800–900 traders, who in turn purchase coffee from 45,000–50,000 noncertified smallholders with whom KCL has no relationship. Coffee produced by noncertified farmers yields a lower price in the international market, and thus secures a lower price in the Ugandan market. Noncertified coffee is delivered in large volume by trucks to the KCL factory in Mbale. When the traders deliver their coffee, the quality is assessed. Traders are paid a per kilo price based on quality through a bank transfer. The only banks that the traders have access to are those in Mbale that are close to KCL offices and those in subregional hubs. They do not have access to banks close to where they purchase coffee from smallholders. Traders must wait up to a full day for the bank transfer to clear. During this time, they often must sleep in Mbale town and return to the field only when the funds have cleared the bank and they can pick up physical cash or transfer it to subregional hubs to cash out and transport it to farms in deeply

rural locations. Traders typically sell to whichever coffee company offers the highest price. Like farmers, KCL offers traders the option of mobile money—which would be available immediately and would free them from traveling with large amounts of cash—in the hopes that the traders will see it as a benefit and increase the likelihood that the traders will sell to KCL first.

However, unlike individual farmers, traders receive large pay-outs that they further disburse to the farmers they sourced coffee from. The limitation with traders receiving mobile money is mobile money wallet size. At the time of this project, individual wallet sizes were capped at 4 million. This has recently changed. To receive large pay-outs via mobile money, individuals are usually required to produce additional documentation at an MTN service center or are required to batch their transactions.

KCL staff

KCL pays many of its staff in cash as well, including washing station staff, drivers and guards who transport the coffee to Nairobi for export. Washing station staff travel in person to Mbale to get paid. This trip can take a half day and cost up to UGX 20,000 (\$5.60). Being paid with mobile money is cheaper and faster than traveling for payment. Staff who travel to Nairobi with coffee to be exported carry wads of cash that must then be exchanged for Kenyan shillings at the border. Mobile money offers safety, and both dominant mobile network providers in Uganda offer cross-border cash-out and off-network payment options.

IV. DIGITIZATION PLAN

KCL’s primary objectives of digitizing payments was to improve the livelihoods of its farmers and increase payment efficiency while lowering the risk of cash-based payments. For MM4P, the financial inclusion of smallholder farmers, traders, and KCL staff at the six washing stations and district head office was the primary driver.

Another priority for KCL was to build a stronger connection between its farmers and the formal financial sector. KCL estimates that the majority of its farmers are financially excluded and, therefore, lack access to credit, insurance, and other services that could help them to procure better quality seeds and fertilizers—improving yield in the long run and increasing economic resilience.

Certified smallholders were an important target group for the digitization effort. For KCL, building a value proposition—digital payments as the gateway to access additional “desirable” financial services by farmers was key. Moreover, digital payments also reduced the perceived and real risk around cash. Internally, digital payments enabled KCL to have greater

control over funds, increase transparency, and leverage efficiency gains.

Digitization sequence

Digitizing agriculture value chain payments is a complex and multi-stakeholder process. In addition to the infrastructural constraints that exist in a deeply rural environment, the project also had to grapple with low phone ownership and mobile money use among the target payees. (See Figure 2.)

Season 1—Prepare the digital infrastructure. Preparing the ecosystem for digital payments happened in the pre-pilot phase (November 2015–February 2016). Tasks included building the right partnerships, installing mobile network infrastructure, launching phone sales, designing the technical platform that facilitated digital payments, training staff on its use, and testing the platform with internal end users (i.e., KCL staff and select vendors). See Table 2.

Season 2—Test with staff and farmers. In the next coffee season (July 2016–February 2017), KCL and MM4P

FIGURE 2. The digitization sequence

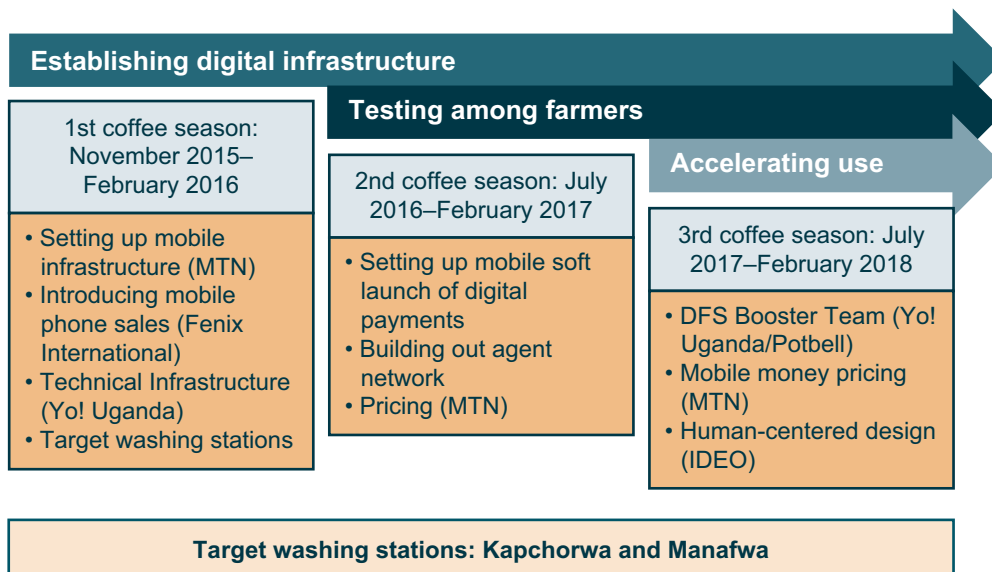


TABLE 2. Preparing the digital infrastructure

Coffee Season 1, November 2015–February 2016	
Mobile infrastructure (MTN)	Install network-base stations for mobile coverage.
Mobile phone sales through Fenix International, an off-grid solar company	Test phone lease-to-own products with a pay-as-you-go (PAYGo) model.
Technical infrastructure (Yo! Uganda)	Build and launch a digital payment platform.
Training and testing	Train KCL staff (finance and staff at washing stations) to using the platform.
	Test the platform with internal staff.
Target washing stations for the pilot	Kapchorwa and Manafwa

introduced digital payments as an option to farmers. The goal was to provide farmers with the opportunity to take either part or all their payment via mobile money and to allow for organic market growth. Ultimately, organic growth did not take hold, and KCL and MM4P designed a more robust recruitment campaign to encourage awareness and the uptake of mobile money. See Table 3.

Season 3—Accelerate use. The third phase (July 2017–present) introduced an intense approach to spur use. A DFS Booster Team—an operational team whose main objective was customer acquisition, the acceleration of phone sales, development and liquidity management of mobile money agents, and merchant acquisition—was created. (See Table 4.) This phase was not planned at the onset

of the project; it was developed by the project team based on what it learned from the slow uptake. Thus, the project approach was redesigned to address earlier shortcomings.

Initially, the project included segmenting payees and gradually on-boarding farmers and traders over 2–3 years. (This time frame later proved to be insufficient. A more realistic period for developing a compelling digital payment value proposition in a deeply rural area would have been closer to four years.) The limited infrastructure in deep rural environments, behavioral changes required among digitally low-literate end users, the need to strengthen financial access points, and the need for the right partner investment strategies impact the timeline.

TABLE 3. Testing

Coffee Season 2, July 2016–February 2017	
Soft launch of digital payments	Offer cash or mobile or both money payment options to farmers.
Agent management (MTN)	Schedule agency recruitment—the recruitment did not happen, which negatively impacted uptake.
Pricing (MTN)	Tailor pricing models—models were not ready until the next coffee season.
Target washing stations for the pilot	Kapchorwa and Manafwa

TABLE 4. DFS Booster Team

Coffee Season 3, July 2017– February 2018	
Booster Team (Yo! Uganda/ Potbell Ltd.)	Establish MTN commercial agreements that allow Yo! Uganda/Potbell Ltd. to recruit and manage MTN agents. The Booster Team initiates merchant acquisition and manages phone sales.
Mobile money pricing (MTN)	Launch a new pricing model nationally (in December 2016), to drive uptake and use in rural areas.
Mobile financial services (MTN)	Introduce a savings and lending product nationally (in August 2016).
Human-centric design (IDEO)	Start to redesign the payment process at the washing station to improve staff and farmer digital payment experience.
Target washing stations	Kapchorwa and Manafwa

V. PARTNER ROLES AND INCENTIVES

Operationalizing digital payments requires a focus on a diverse set of challenges, including increasing back-end and front-end readiness of the bulk payer to process and disburse digital payments; lock in agreements with service providers; and identify, educate, and recruit payees.

Initially, the plan was to include KCL (payer), farmers (payees), MTN (digital wallet provider), and MM4P (technical assistance and grant provider)—actors that would play important roles in digitizing the agriculture value chain. MTN, KCL, and MM4P were the only partners expected to be a part of this process. However, between the planning phase before the first coffee season and the third coffee season, the number of partners grew to seven and included Yo! Uganda (payment aggregator), Fenix International (solar company), Potbell Limited (mobile money agent manager), Vital Wave (consulting firm supporting MM4P's technical efforts), and IDEO.org (human-centric design firm).

The number of stakeholders, cost, and complexity of the coffee digitization process were extensive because users in the targeted areas lacked the technical literacy required, and the DFS infrastructure was limited. A similar initiative in an urban or peri-urban setting that has a better payments infrastructure and where mobile money agents are ubiquitous and liquid and require less help to support the DFS ecosystem would be less complex and costly, and potentially would have higher up-take and use. Despite the challenges, the private-sector entities involved in this plan invested in Kapchorwa and Manafwa because of the potential of scale. Over 75 percent of the Ugandan population resides in rural areas, and urban markets are growing increasingly competitive and are becoming saturated, which limits year-on-year revenue growth rates for service providers.

KCL's role and incentives

KCL is a large agricultural exporter of coffee—a key cash crop. KCL's involvement meant that the initiative would have access to KCL's farmers—6,000 certified and more than 45,000 noncertified small-holder farmers—and its understanding of how payments in the agriculture value chain work and of the dynamics between various actors in the chain and its window into the real-world challenges around digitizing payments. The following highlights several reasons why KCL wanted to switch to digital payments.

Staff, farmer, trader, and company security. Although KCL staff have not reported any theft of cash while in official transit, the ambitious growth projections and growing operations could expose staff to such risks. KCL also wants to ensure the safety of farmers and traders who may be in transit with considerable amounts of cash. Large cash disbursements by companies like KCL often do not have theft insurance, and if they do, it is extremely expensive. Digitization helps KCL protect itself from cash being stolen during the payment process. Digitization also has the potential to bring in significant efficiency gains for all actors in the value chain.

Financial inclusion for improved production. Digital payments create a financial history. Financially included coffee farmers with data trails of their financial inflows and outflows have a greater chance of accessing credit and insurance products, particularly during the off-season (i.e., April to June) when they lack funds to invest in agricultural inputs, particularly new coffee trees that improve yield and quality. KCL's strategy includes creating an environment that empowers its farmers to bridge their agricultural financing gaps from formal sector providers, and helping in

consumption smoothening by registering farmers in secure digital savings products.

Farmer/trader loyalty and long-term profitability. Coffee farmers and traders are free to sell to any company they choose. KCL, like most agriculture companies, is keen to increase farmer and trader loyalty, which would make year-on-year coffee export quantities and subsequent revenues more predictable. Easy access to financial services that are efficient and help improve the financial lives of farmers and traders has the potential to increase KCL's stickiness with its sellers.

To increase loyalty, KCL provides services that improve the lives of coffee farmers and traders. Access to DFS through efficient and easy digital payments opens the door to follow-on digital products that can help strengthen farmers' resilience to financial shocks in the medium to long term.¹² KCL also employs other loyalty mechanisms such as profit sharing in exports with farmers between coffee seasons and agriculture extension services by KCL's corporate social responsibility unit to help increase farm yields. KCL's goal is to entice coffee farmers—especially certified farmers—to sell their coffee to KCL.

Cost savings. Although KCL is interested in cost savings, it is not the primary driver for its participation in the program. Some agriculture companies face large costs around cash payments to farmers and traders (McKay and Buruku 2016). Digital payments can lead to considerable savings. However, in the case of KCL, the burden of making cash payments was not a big cost driver and the future cost-saving benefits that arose from digitization were a bonus. The efficiency gains and reduction in leakage that came with shifting to digital payments was the main motivator for KCL to join the program.

Leveraging the partnership with MM4P for technology investments. The first step in payment digitization is the “computerization” and digital documentation of manual processes and information pertaining to payments. This requires investing in hardware such as tablets or computers at washing stations and internet connectivity for data entry. The second step is to create a payment platform. Depending on the needs of the exporter, the payment platform could be an off-the-shelf product or a customized software solution that caters to the needs of the company. **For KCL, participation in a donor-funded initiative helped offset some of these big costs and gain significant technical support.** (See Box 4.)

BOX 4. Cash to 100% digital payments can be a slow transition

During this project, KCL offered its farmers the choice of accepting payments in cash, mobile money, or both. This meant that KCL had to maintain two payment processes that worked in tandem and were reconciled at the end of each day. For any bulk payer, an abrupt movement from one payment mechanism to the other is rarely an option. Digitizing payments is a process, and the transition period between cash to 100 percent digital payments requires maintaining two processes that are expensive in the short term. Efficiencies and cost-savings are realized once all payments are digital and cumbersome manual processes are eliminated.

¹² In Uganda, greater financial inclusion is the key to unlocking rapid growth (Sebudde 2017).

A key technology expense for the project was the design and implementation of a payment platform built to KCL's specifications (i.e., software development). Bulk payment digitization can be undertaken with standardized interfaces available from MNOs (in the case of a mobile money payment option) and several payment aggregators. However, some agricultural bulk payers may need a specialized interface that calculates payment amounts based on the daily commodity prices paid per kilo and the exact kilos delivered by each farmer. KCL also sought a system that would track both cash and mobile money payments, which required a complete redesign of the payment aggregator's (Yo! Uganda's) existing platform; MNOs do not provide these types of modifications. Using a standard platform that provides a means to track the amount of cash transacted does not come with capital expenditure consequences. On the other hand, purchasing a customized platform that tracks, for example, the exact amount of coffee delivered per day, the price paid, and payment outflows both in cash and digital form is more akin to purchasing an inventory and payment tracking system. Depending on the level of detail, this can be quite expensive.

Before this experiment, KCL farmers were required to keep copies of their paper receipts to claim profit-sharing bonuses after the close of the coffee season (usually in May). Farmers were reluctant to trust a system that didn't provide paper receipts, even when they were assured the receipts were no longer necessary. For that reason, the system had to be designed to provide a paper receipt for an otherwise digital transaction. Specialized rugged, dot-matrix printers were required to ensure that the receipts would withstand the agrarian environment in which they were used.

Finally, because KCL finance systems needed to interface with the new platform,

Yo! Uganda added a new corporate finance module to the platform.

MTN's role and incentives

MTN was the mobile network and wallet provider for this project. MTN Uganda hoped to increase its rural market penetration both on mobile money and regular GSM services (voice, SMS, and data). Although it is the market leader, MTN faces stiff competition in urban markets, especially in the capital city of Kampala, and is pursuing a stake in less developed rural markets.

MTN's CEO supported the initiative, which resulted in faster response times from the heads of different business units within the company, even though the business case was not clear upfront.

Building the MNO business case

MNOs like MTN make a profit based on uptake and use of voice, data, and mobile money. With urban markets increasingly getting saturated, rural or nonurban markets are the next frontier. This is particularly true in Uganda where 80 percent of the population resides in nonurban and rural settings. However, penetrating rural markets is both more complicated and more expensive than it is in urban markets because of limited mobile phone penetration, marginal payments infrastructure (bank branches, mobile network towers, mobile money agents, etc.), limited user capability and knowledge (low technological literacy, lack of confidence in technological platforms of service delivery, etc.), and sparse populations.

The Kapchorwa washing station—the primary location of the project—did not have good cellphone coverage. To help uptake and create a seamless flow of mobile money, MTN needed to put a cellphone tower at the station.

All new cellular towers are evaluated using two main criteria:

- Tower saturation. Are surrounding towers oversubscribed, thus signaling high customer demand and the need for additional tower placements?
- Estimated population density. Is there sufficient population density and potential for uptake resulting in a sizeable addressable market, particularly for the GSM business?

Initially the KCL project site in Kapchorwa did not meet either criterion. The nearest tower was over 15 km away and was not oversubscribed. MTN made conservative estimates of uptake (related to low rural phone ownership) because it did not believe the population was sufficiently dense. The business case accounted for the costs of creating a permanent infrastructure—a base transceiver station (BTS)—that would lead to a large capital investment and longer break-even timelines. **Despite support from the CEO, MTN’s financial leadership was uncomfortable with the plan and was hesitant to endorse a project that required a large capital expenditure with uncertain returns.**

Protecting MTN’s downside

UNCDF’s internal estimates suggested that voice uptake would exceed MTN’s conservative projections and forecasted that the site would become commercially

sustainable in the near term (i.e., within a year). Based on predictions of potential tower use, size of local population, current phone ownership rates, and future phone ownership, UNCDF offered MTN a loss guarantee fund to support tower installation. MTN could call on this loss guarantee fund up to a certain ceiling within a 12-month period. This arrangement protected potential losses MTN could incur early in the project.

In December 2015, MTN Uganda opted to deploy a mobile BTS, which required a lower initial investment than would the permanent infrastructure. This temporary set up provided the necessary mobile network coverage needed to launch payments.

The tower over performed in the first three months and proved to be profitable; it had a user base of both farmers and non-farmers. The non-farmer users exceeded the number of KCL coffee farmers by a large margin. **Based on the tower’s consistent performance, in July 2016, MTN Uganda installed a permanent BTS in Kapchorwa. The loss guarantee fund was never used.** (See Box 5.)

With declining global average revenue per user (ARPU), MNOs are closely guarding their bottom lines. Rural investments can be risky and eat into already thin margins. In this case, a donor intervention provided MTN with an opportunity to learn and invest in a very rural setting, with very little downside.

BOX 5. Basic telephony became the first success and impact metric of this initiative

The Kapchorwa cellphone tower provided telephony to a deeply rural community for the first time. Kapchorwa community members later told MM4P staff that the ability to communicate with family members in distant locations and the ability of farmers to access market information and make better-informed business decisions were some of the most impactful early results of the initiative.

Increasing the conversion ratio of GSM subscribers to mobile wallet users through bulk payments

Digital agricultural payments, humanitarian transfers, social welfare payments, and so forth help MNOs to acquire a large mobile money customer base at once—particularly in frontier areas (i.e., areas not easy to serve). These types of use cases give users a reason to open mobile money accounts and increase the conversion ratio of GSM subscribers that are also mobile wallet owners. During the KCL project, MTN observed a higher rate of GSM to mobile wallet conversion than the national average, currently at 32 percent (FII 2016).

Persuading customers to use mobile money is a major challenge for mobile wallet operators. They have found that on-boarding programs for customers are not enough to change their behavior in favor of using mobile money. If customers do not have a compelling reason to use electronic value, they will either cash out and continue using cash or abandon the wallet altogether. Hence, it was critical from operators to build an electronic spend economy that has enough digital payment acceptance points (i.e., merchant network) and use cases that compel customers to use their wallets.

Building the mobile money cash-in/cash-out infrastructure

There were only a few MTN mobile money agents in Kapchorwa and Manafwa—the pilot mobile money deployment areas. Those that were in place lacked the liquidity to cash out farmers during harvest season. UNCDF supported MTN Uganda in building its agent network. However, this effort did not launch in time to support KCL payees during the July 2015 to

February 2016 season. **The lack of liquid agents in Kapchorwa and Manafwa diminished the value proposition for KCL farmers and thus uptake during the initial testing period was low.**

Yo! Uganda's roles and incentives

Yo! Uganda is a leading payment aggregator in the mobile money and payments sector in Uganda. Aggregators are software firms that design payment solutions that facilitate the flow of funds between payers and payees irrespective of the payment instrument or channel used.^{13, 14} When it comes to bulk payments, payment aggregators facilitate the process of paying numerous recipients across multiple providers; they also design customized platforms for large bulk payers.

Yo! Uganda allows bulk payers like KCL to interact with all major MNO mobile money systems through a single platform and without having to open an account and transact separately on each network. Without Yo! Uganda, KCL would have had to map employees, farmers, and traders to the network they subscribed to, open an account with each MNO, and transfer the exact payment amount. By using Yo! Uganda, KCL financial staff could use an interface with a single platform, and Yo! Uganda took on the burden of balancing float and ensuring the payments go to the correct mobile wallet, irrespective of network.

Yo! Uganda designed and built the software that enabled KCL to make digital payments, record the amount of coffee delivered at each purchasing location in real time, and track cash payments. The cost of this software was funded by UNCDF.

Aggregators like Yo! Uganda provide enhanced customer service and de-

¹³ This depends on the number of payment providers and types the aggregator is connected to.

¹⁴ See McKay and Pillai (2016).

tailed reporting capabilities that enable real-time transaction visibility that is not supported by a paper-based system. MNOs do not typically need to do any customization, nor do they need to provide extended onsite training or significant bulk payer customer support. (See Figure 3.)

Yo! Uganda also was responsible for recruiting agents, managing liquidity, and acquiring mobile money customers. These are typically MNO responsibilities, but because of MTN's limited capacity, MM4P hired Yo! Uganda to provide these services. Yo! Uganda added a new service to its business by creating a DFS Booster Team to acquire agents and customers.

Potbell Limited. In June 2016, the project team and Yo! Uganda hired Potbell Limited to recruit mobile money agents and manage liquidity in target areas to strengthen the mobile money agent network around KCL's farmers. Subsequently, Potbell entered into a commercial agreement with MTN Uganda to be a master agent.

Aggregators typically charge a flat fee on a per transaction basis for bulk

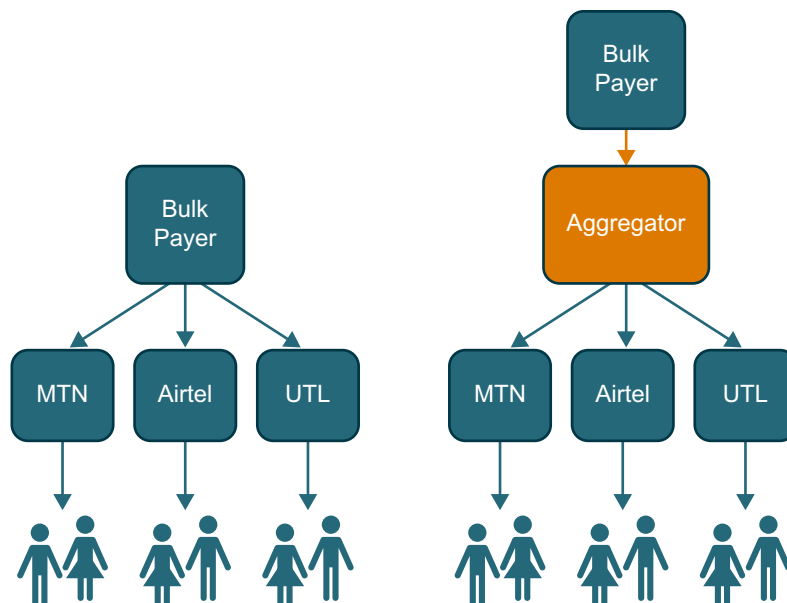
payments and, therefore, have strong incentives to serve high-volume clients. With several thousand payees, KCL is one of the large payers in the country.

The incentive for Yo! Uganda was not limited to immediate monetary compensation. On a more strategic level, Yo! Uganda was interested in entering the agriculture value chain market, particularly coffee because it is the largest cash crop in the country. Moreover, partnering on a donor-funded project came with both short-term and long-term technical and financial benefits. The agriculture value chain platform created for KCL was entirely subsidized by MM4P. Yo! Uganda also received technical assistance support from MM4P for the duration of the project. The software and implementation experience Yo! Uganda gained working on this initiative makes it an attractive solution provider to other agriculture companies and agriculture bulk payers.

Fenix International's roles and incentives

Fenix International designs, manufactures, and distributes lease-to-own solar home systems that provide lighting,

FIGURE 3. Direct-to-MNO payments vs. aggregator-enabled payments



phone charging, TV, and radios. These home systems are financed through affordable installments and paid via mobile money by their customers. Fenix is an exclusive partner to MTN Group, and its customers can pay only via MTN mobile money. Fenix was the phone and charging solution provider in this effort.

Vital Wave's roles and incentives

Vital Wave provided technical support to UNCDF.¹⁵ It helped KCL select an aggregator, and helped KCL and Yo! Uganda design a platform and approach that would be user friendly for KCL staff. They also assessed connectivity and power availability at payment locations, to design the KCL payment user interface. This work led Vital Wave to produce a step-by-step guide to digitizing bulk payments.¹⁶

Vital Wave also addressed mobile money pricing during the project. Mobile money fees, particularly cash-out fees, can be prohibitive for small-ticket transactions. Unfortunately, MTN Uganda's platform did not permit closed user group¹⁷ pricing adjustments for cash-out fees, and

so cash-out fees ultimately were not addressed as part of this implementation. MTN's high cash-out fees inhibited uptake and continues to be an issue for both KCL payees and other rural users of mobile money in Uganda.

UNCDF's roles and incentives

UNCDF's primary motivation to invest in rural agriculture value chain digitization is financial inclusion. Over the course of this initiative until the end of 2017, the **MM4P program had invested over \$400,000 into the project.** A large portion of the investment went to funding the operations of the Booster Team and building the bulk payment platform. MM4P had set aside an undisclosed amount as the loan guarantee toward MTN, in case the BTS ran into losses the first year. MTN never had to call on these funds because the BTS over-performed within the first three months of its installation.

Table 5 provides insight into the direct and indirect costs and current and future revenue incurred by the participating entities.

¹⁵ Vital Wave is funded by the Bill & Melinda Gates Foundation.

¹⁶ <http://vitalwave.com/case-study/bulk-payment-implementation-toolkit/>

¹⁷ Subscribers to a closed or special group that have specialized pricing.

TABLE 5. Cost and revenue drivers for each entity

Entity	Key costs	Current and future revenue sources	Lessons learned
KCL	<p>Direct costs</p> <ul style="list-style-type: none"> • Bulk payment transaction fees to Yo! Uganda • Development of a customized payment platform is a direct cost KCL would have incurred. In the case of this project, UNCDF paid for these costs. <p>Indirect costs</p> <ul style="list-style-type: none"> • Staff costs in payments systems training and implementation • Indirect staff time cost of maintaining both cash and digital payment systems 	<p>Higher revenue</p> <ul style="list-style-type: none"> • Higher coffee acquisition from existing (brand loyal) and new farmers/traders attracted by KCL's increased value proposition of financial linkages <p>Cost savings</p> <ul style="list-style-type: none"> • From reduced risk of cash pilfering and theft (adjusted insurance coverage) 	<ul style="list-style-type: none"> • KCL realized that back-end and front-end processes must be digitized along with payments for optimal efficiency. This is a long-term investment. • Digitization increases transparency immediately and can be used to benefit both the immediate and long term. • Payment digitization can be used as a comparative advantage—both traders and farmers can be paid immediately and digital payments do not come with the lag time associated with manual cash pay-outs. It consequently helps build loyalty, strengthens ties with current farmers/traders, and attracts new coffee suppliers • Scalability: Digital processes and payments can be a powerful engine for growth. This initiative supports KCL's ambitions to expand coffee procurement and exports.
MTN	<p>Direct costs</p> <ul style="list-style-type: none"> • Mobile network infrastructure installation (BTS) • Monthly maintenance (rental site and generator fuel) • Commissions to agents and agent managers, namely Portbell <p>Indirect costs</p> <ul style="list-style-type: none"> • Staff time at corporate headquarters, including legal, finance, marketing, mobile money departments 	<p>GSM (voice and data) and mobile money revenue from target communities</p>	<ul style="list-style-type: none"> • This donor-funded initiative helped MTN understand and refine its rural go-to-market strategy. • MTN's initial business case assumptions on consumer uptake were artificially low because MTN heavily discounted the number of community members, apart from the farmers, that would be interested in using regular cellphone service.

<p>Fenix International</p>	<p>Direct costs</p> <ul style="list-style-type: none"> • Up-front cost of mobile phones and solar solutions <p>Indirect costs</p> <ul style="list-style-type: none"> • Staff time at corporate headquarters (product development, finance, sales department) and field offices (regional sales manager and associates) 	<ul style="list-style-type: none"> • Sale of mobile phones • Sale of mobile-enabled solar solutions • Interest from financial products 	<p>The plan was to ride on agriculture value chains to acquire new off-grid solar customers and, if successful, use the pilot to scale via other agriculture value chains.</p>
<p>Yo! Uganda</p>	<p>Direct costs</p> <ul style="list-style-type: none"> • Outsource agent and customer recruitment (Booster Team) to Potbell Ltd. (This was fully subsidized by UNCDF, with technical support by Vital Wave.) • Develop customized digital bulk payment platform. (For the project, this was entirely subsidized by UNCDF.) • Redesign payment user interface and user experience based on feedback from the human-centric design team <p>Indirect costs</p> <ul style="list-style-type: none"> • Staff time (training KCL staff) 	<ul style="list-style-type: none"> • Fees from bulk payments and bulk SMS transmission (KCL). • The cost of the Booster Team. (The initial subsidy from UNCDF included performance-based bonus payments. Subsequent revenue was derived from commercializing the Booster Team for other bulk payers.) • Commissions paid by MTN on agent acquisition and management 	<ul style="list-style-type: none"> • This project provided Yo! Uganda with a detailed understanding of the investments needed to build customized services for agricultural exporters. • It also helped it to get a sense of the economics of the volume and value of transactions it needs to process to be profitable per value chain across a bulk payment platform. • The establishment and experience of the Booster Team created a new revenue stream for Yo! Uganda.
<p>UNCDF</p>	<p>Direct costs/investment</p> <ul style="list-style-type: none"> • UNCDF's direct investment was more than \$400,000. This mostly paid for the Booster Team and platform development. • UNCDF set up a loss guarantee fund for MTN, but these funds were not used. 	<p>*No financial revenues* Benefit: Financial inclusion for the poor</p>	<ul style="list-style-type: none"> • Funding cycles of 2–3 years may be too short to achieve ecosystem development. • A neutral broker/donor needs to connect the various providers of the DFS ecosystem.

VI. PROJECT RESULTS AND CONTINUOUS ITERATION

The effort to digitize KCL coffee payments and provide financial services to farmers and traders is ongoing. Currently in the third season of digitization, the project is growing to reach the initial target of 6,000 certified farmers. However, progress has been slow for a variety of reasons. Chief among them is the perceived high cost of the service by the end-users. The business case for this implementation—as for all mobile money bulk payments—is based on scale; slow growth has thus impacted the business case for both the service providers and KCL. Figure 4 illustrates the process over the span of three coffee growing seasons.

Season 1: November 2015–February 2016

During the first coffee season when mobile payments were first introduced, overall uptake by staff was slow. The uptake by farmers—the intended clients for this project—was virtually nonexistent. The primary factors that contributed to disappointing results included:

- The paucity of mobile money agents.
- Low awareness by farmers of mobile money payment options.
- High reluctance, among farmers who were aware, to accept mobile money, which was exacerbated by the reluctance of KCL washing station staff to diverge from their routine cash purchasing process.¹⁸

MTN mobile base station transmitter

The project’s commencement was delayed because of various constraints as

mentioned in earlier sections. In late 2015, MTN’s management approved the project and erected a mobile base transceiver station (MBTS), a temporary tower in Kapchorwa that provided network coverage.

The project’s first success was the establishment of a telephone network in Kapchorwa, a rural community approximately two hours north from Mbale. MBTS effectively connected community members to the outside world. One community member exclaimed, “For the first time I am able to call my family in Kampala, from my own home!”

Although MTN built the MBTS, community members attributed this advancement to the KCL initiative, and KCL was praised heavily within the community.

Fenix International mobile phone sales

Fenix International launched mobile phone sales in December 2015 targeting all coffee farmers (both men and women) in Kapchorwa and Manafwa. See Table 6 for financing details.

For this initiative, Fenix International decoupled solar home systems from sales of phones, and female farmers received uncollateralized loans for phones. Fenix International sold phones to approximately 230 (31 percent) of the 720 registered female farmers with KCL, with the intention of increasing phone ownership among women.

Traditionally Fenix International sells phones coupled with its lease-to-own solar home systems. The solar home systems function if the client is up to date on his or her payments, which are

¹⁸ KCL washing staff found the digital payment process burdensome because it required a new set of skills to operationalize and a new set of processes to learn. In late 2016, this process was redesigned to facilitate staff use.

FIGURE 4. Digitization results and challenges

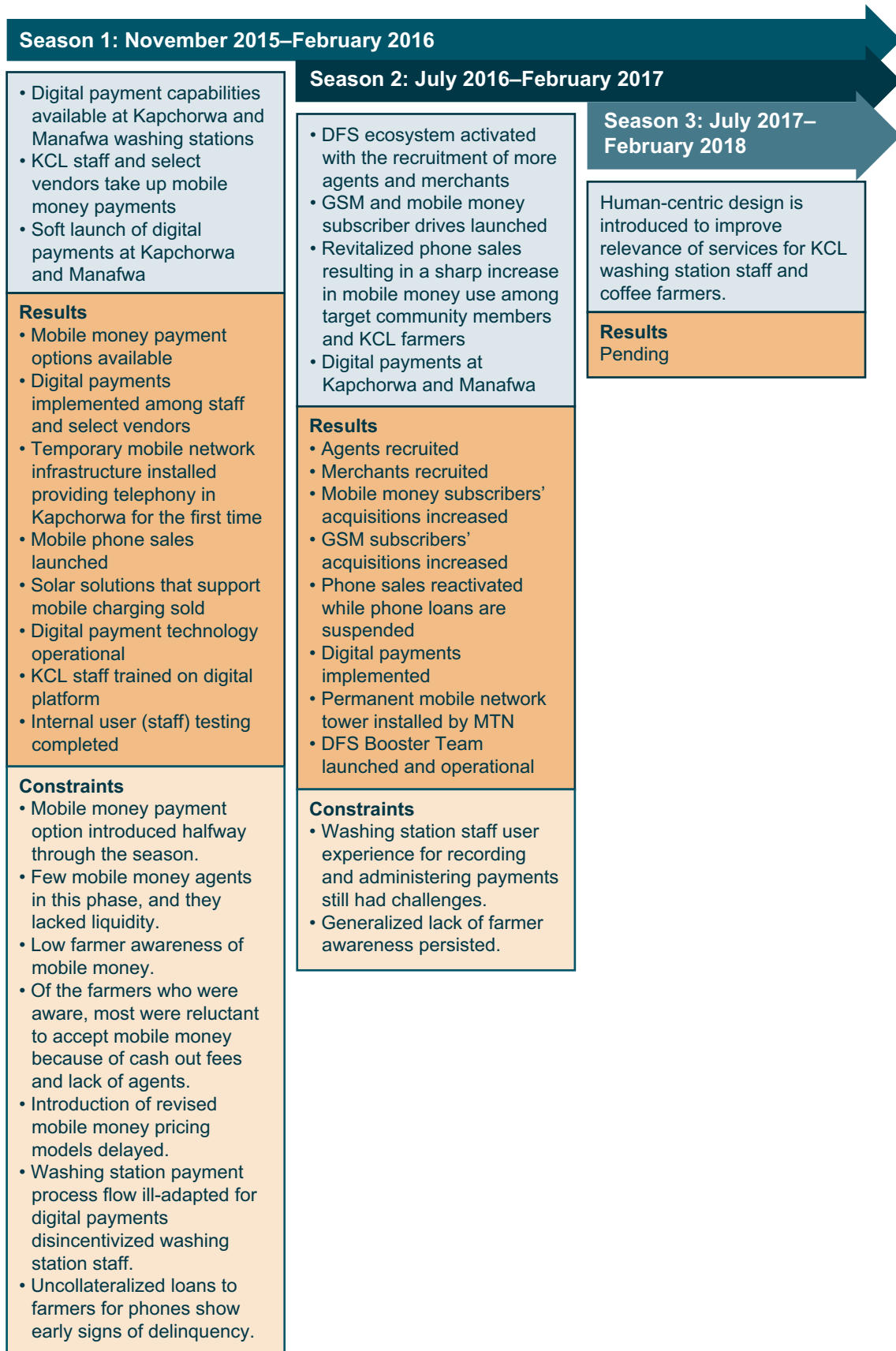


TABLE 6. Fenix International sales

Phone Loan Structure		USD
Deposit	UGX 6,500	1.85
Daily rate	UGX 500	0.14
Duration	85 days	
Total Price	UGX 49,500	14
USD = 3500 UGX		

typically collected via mobile money. If payments are not up to date, the systems are disconnected. The phones that Fenix International piloted for KCL female farmers were sold without the solar home system. Fenix International relied on its clients' interest in maintaining a good credit score with the company to act as an incentive for repayments. A good credit score would translate into female farmers being eligible to receive solar home solutions on a lease-to-own model.

Client interviews indicated that repayment rates were low because customers did not know how to pay installments with mobile money. Ultimately, Fenix International opted to discontinue the micropilot. It continues to sell the home solar system bundled with the mobile phone product.

Yo! Uganda—Training and testing

Yo! Uganda manages both mobile money and cash payments for KCL. KCL requested the system be tested on a small group before it was presented to farmers. Thus, in the first coffee season and the subsequent months, Yo! Uganda focused on training KCL staff on how to operate the system and on limited testing by paying security guards, cross-border transporters, and a few others via mobile money. This internal testing allowed KCL to understand the functionalities of the digital payment platform.

Preparing for Season 2

In the months leading to Season 2, MTN Uganda attempted to address agent network quality and liquidity management, as originally agreed in the project's design phase. Immediate solutions were not found, leaving the Kapchorwa and Manfwa washing stations with weak mobile money agent penetration.

Although the option to receive payments digitally was available at the washing stations, the lack of mobile money agents discouraged KCL's management from actively encouraging farmers to accept mobile money payments out of fear that a negative first-time experience with mobile money would do more damage than good. During this time, however, mobile money payments among KCL staff grew. For example, although washing station managers were not encouraging farmers to accept mobile money, they themselves were benefitting from the efficiency of digital payments—it saved them the time and money spent traveling to Mbale to collect their monthly salaries in person.

Yo's Uganda's digital platform allows a farmer to accept a split payment—a combination of cash and mobile money of the farmer's choosing. The hope was that this functionality would encourage farmers to safely save some of their income in a digital wallet. However, the utility of mobile money for farmers—beyond person-to-person (P2P) transactions—was not well defined. The following is a standard refrain heard during field research into methods for scaling payment: **“The problem with mobile money is the cash out fees. Cash is free and easily accepted here—why would we use mobile money?”**

For farmers, the perceived value of mobile money is in P2P payments. To farmers, accepting mobile money payments for reasons outside of P2P—especially

in the absence of a robust agent network—is essentially locking money away. Though some farmers did see the value of digital wallets for savings, most of them thought the cash fees were too high to use mobile money as a safe place to save. (See the Annex for details on MTN Uganda’s cash-out fees.)

Although Vital Wave worked with MTN to revise its rural cash-out pricing model for P2P fees, the new pricing regime was not launched until the second season. It was clear the issues of pricing, agency, and awareness would hinder the project during the second season, spurring the implementers to seek innovative resolutions.

Season 2: July 2016–February 2017

In the months preceding the second season, project implementers rallied to rethink and revise the approach to implementation. The following were among the key changes:

- The grant for agent management that was initially assigned to MTN was shifted to Yo! Uganda.
- Yo! Uganda agreed to support agent development in exchange for concerted technical assistance, which was not one of its strengths.
 - An agent management and liquidity firm—Potbell Ltd.—was hired to provide the service and train Yo! Uganda staff and management.¹⁹
 - Yo! Uganda through Potbell established a DFS Booster Team that supplemented agent recruitment and management with a mobile

money subscriber drive, market awareness efforts, and merchant acquisition in partnership with Potbell Ltd.

- Fenix International agreed to return to the consortium with lockable smart phone solutions, anticipated in 2017. Thus, requiring it to “sit out” the second season.
- Yo! Uganda would also provide mobile phone sales for this season, with no financing options—customers would need to buy the phones outright.

These efforts resulted in initial uptake among rural community members and KCL farmers.

Results of the Yo! Uganda DFS Booster Team

The UNCDF-funded Yo! Uganda’s DFS Booster Team was designed to bolster the MTN subscriber base in the region through a combination of subscriber recruitment and education campaigns on the use of phones and mobile money. It was also intended to substantially increase the number of agents serving this area and to develop better liquidity management. It was funded for about eight months, from July 2016 to February 2017, to correspond with the coffee season.

In addition, a program was created to bring low-cost phones to farmers without financing. The concept of a DFS Booster Team—designed to support uptake of mobile network services in proximity to a large bulk payment—is new in this industry.²⁰

¹⁹ Potbell was not yet registered with MTN as a master agent.

²⁰ The DFS Booster Team focused on KCL farmers and nonfarmers who offer GSM and mobile money subscriptions and support services, such as phone and mobile money literacy and mobile money agency support.

The Booster Team, which became a new division in Yo! Uganda, comprised 24 members who were deployed to the washing stations and surrounding communities. Each team member was equipped with the equivalent of an agent line that was used to record know-your-customer (KYC) data and to register customers for SIM cards and mobile money in the field.

Between July and December 2016, the Booster Team recruited 17,651 new MTN customers. Of those, 11,500 were active, revenue-generating GSM customers for MTN as of the end of the year. Furthermore, these customers generated almost 10 percent more in monthly ARPU than MTN had estimated. Also, nearly 75 percent of the new customers recruited and trained by the Booster Team activated their mobile money wallets. This was exceptional because, typically, only half or slightly more than half of all GSM customers register their mobile money wallets nationally. See Figure 5.

By the end of the second coffee season in February 2017, the total of new MTN subscribers (GSM) recruited by the Booster Team stood at 20,311.

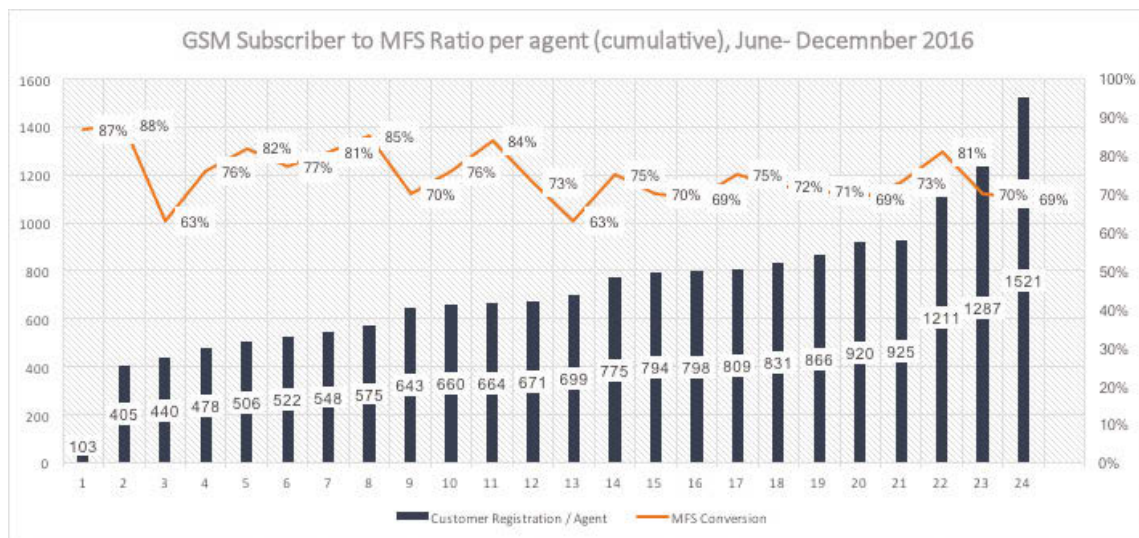
Fifty-three percent of these subscribers were 90-day active mobile money users.

During the second coffee season, mobile money payments to farmers as well as mobile money payments to staff increased. The Booster Team also focused on increasing the number of agents in the area. More than 129 agents were recruited, well over the 100 targeted. **However, liquidity management (rebalancing of cash and e-float) of the agent network is a constant challenge. On average, agents need to be rebalanced at least once a day, and rebalancing points are few and far between in rural areas.**

The new agents are making fewer transactions than the 34 average daily transactions that an established agent makes (Bersudskaya and Kuijpers 2016); however, this is typical of newer agents.

Recruiting merchants who accept digital payments is traditionally one of the most challenging aspects of deploying digital payments, especially in rural areas. To date, the Booster Team has recruited and on-boarded over a dozen new merchants.

FIGURE 5. GSM subscriber-to-MFS ratio per agent (cumulative), June–December 2016



DFS Booster Team: Key performance indicators

The team focused on the fundamentals of customer engagement, specifically on registrations and activations of MTN mobile money users and MTN agents, including providing liquidity support services and customer education (on phone and mobile money use). MTN's GSM ARPU in the Booster Team's catchment area grew 34 percent in six months—a high rate for a rural environment. Likewise, the mobile money average conversion rate (the rate at which GSM users open mobile money wallets) surpassed the national average by 25 percent.

Although MTN and Yo! Uganda gained insights on approaches to engage rural communities, the value proposition of mobile money services for rural consumers' needs to be stronger for it to be truly relevant to household financial inflows and outflows over time (see Table 7).

Booster Team sustainability

One of the central questions around the Booster Team is if and how Yo! Uganda stands to make a financial return. The major costs of the Booster Team are its human resources followed by transportation stipends and logistical expenses related to field work.

Ideally, a Booster Team could earn commissions for agent and customer recruitment from the MNO. Since Yo! Uganda was not a direct agent manager contracted by MTN, UNCDF's grant paid the team's expenses. Yo! Uganda's strategy is to establish commercial ties with new, large bulk payers and other MNOs as it sells and expands the Booster Team's services to reach scale and become profitable.

The sustainability of such an effort relies on scale. The up-front costs are

significant, and time is required to reach optimized operations and economies of scale. Irrespective of whether stakeholders choose the approach of a Booster Team or an alternative, this initiative shows that some level of support to consumers, agents, and the bulk payer is necessary.

Pricing and uptake

Mobile money service providers—in this case, MNOs—charge a cash-out fee when customers withdraw funds from their wallets. These fees pay for the cost of agent networks and generate a profit for the MNOs. MTN Uganda's platform lacked the functional capability to change the cash-out fees and corresponding agent commissions.

However, MTN was able to reduce P2P fees and did so at the end of 2016. The P2P price change focused on lowering the transaction costs of remittances at the lower bands, to benefit low-income consumers. (See Table 8.)

Season 3: Introducing human-centered design

In November 2016, UNCDF partnered with a human-centric design firm (IDEO.org) to improve the relevance and use of DFS. The goal was to understand how to accelerate the adoption of mobile money payments by KCL farmers. IDEO.org documented several findings, including the following:

- The bulk payments processes were ill-adapted to the realities of payments at the washing station.
- Engaging farmers on financial strategies could lead to improved farmer awareness of mobile money services beyond P2P and could inform follow-on product development efforts.
- Merchants provided a key “pull” opportunity for mobile money.

TABLE 7. Booster Team key performance indicators results, July 2016–February 2017

KPI	Planned			Actual	
	Farmers and parchment farmers	Community	Totals	Actual	% of target achieved
Subscriber Data: MFS Education and Awareness					
# customers educated on phone use	5,608	18,500	24,108	23,702	98
# customers educated on mobile money use	5,608	18,500	24,108	23,702	98
Subscriber Data: Recruitment and Adoption					
# registered customers	5,608	18,500	24,108	20,311	84
# active mobile money users (90 days)	4,486	7,400	11,886	10,765	91
# active mobile money users (women)	2,200	3,400	5,600	4,054	72
# of unique farmers receiving payments via mobile money per season	4,200	—	4,200	666	16
# of unique employees paid through mobile money	187	—	187	68	36
Agent Recruitment and Activity					
Agents recruited	100	0	100	129	129
Average daily number of transaction per agent	15	0	15	7	47

Season-on-Season Performance via the Yo! platform				
Parameter	2015–2016 (UGX)	2015–2016 (USD equivalent)	2016–2017 (UGX)	2016–2017 (USD equivalent)
Total value of mobile money paid out to farmers during the season	23,500	6.71	59,744,550	17,070
Total value of cash payments tracked through the system	86,729,100	24,779.74	312,809,450	89,374
Total value of mobile money paid out to staff (February 2016–December 2016)	—	—	203,129,536	58,037

TABLE 8. MTN P2P price reductions for the lower bands

Transaction amount (UGX)	Original charge (UGX)	New reduced charge (UGX)	% Reduction
500–2,500	500	180	64
2,501–5,000	500	350	30
5,001–15,000	1,000	600	40
15,001–30,000	1,000	800	20
30,001–45,000	1,100	1,000	9

Payment experience

A great deal of design effort went into the technological interface of the payments system for the washing station staff. However, access to the platform required a laptop. This proved to be cumbersome for washing station staff.

The digital platform was designed to mimic the steps in the cash payment process. All participants involved in user acceptance testing, including washing station staff, agreed that the platform accomplish this goal. Despite the detailed design process, a key component was missed: When

the washing station was crowded with farmers awaiting payment, staff had to go into the office to use the laptop to process a mobile money payment, which made processing considerably slower (in part due to slow internet connectivity) than processing cash payments. See Box 6.

Human-centered design research: Initial findings

Prototyping the revised digital payment processes

IDEO.org designed a new approach where farmers are digitally registered

BOX 6. Payment process snapshot: Cash vs. digital

Coffee delivered by farmers is sorted, weighed, priced, and accepted by the washing station. Farmers would then queue anywhere from 20 to 40 minutes to receive cash payments. This system was familiar to both farmers and staff, and ran smoothly. For a farmer to be paid digitally, however, the established flow was disrupted. A staff member would have to stop processing cash payments and go to the manager's office to use a computer, run the generator for a printed receipt, and log on to the internet to complete a digital payment.

Often, it took time to get a cellular signal strong and consistent enough for the server to successfully authenticate with the payments platform—the attempts would sometimes stall or time out. During busy purchasing times, this disruption of the cash process was viewed as a major inconvenience by staff, and thus it was not promoted. Although UNCDF had engaged MTN Uganda to upgrade the Kapchorwa tower from 2G to 3G to address internet speeds, the payment process flow of cash versus digital was not well-designed for KCL staff or farmers. This situation led at least one washing station manager to oppose use of mobile money for payments. As the key touch-point for the farmers during the payment process, washing station staff have a tremendous influence on uptake.

Note: Click [here](#) to see a video about the cash vs. digital payment process IDEO.org seeks to improve.

(using a tablet) upon arrival at the washing station. This initiates the digital process, with subsequent data entered in real time at different points of the procurement process (weighing, pricing, etc.), leading to real-time payment choices. Digital payments would be triggered (and approved) via the tablet, using established checks and balances processes that eliminates the need to interrupt the cash payment process to log on to a computer in the back office and renders digital payments faster than cash.

Yo! Uganda reconfigured the payments platform and incorporated two key pieces of feedback:

- The payment choice architecture was incorporated into the beginning of the procurement-to-payout chain. In the revised system, washing station staff ask farmers if they want to be paid in cash, mobile money, or a split payment between both, at the beginning of the process—and this is embedded within the procurement process itself. This configuration allows the payment process to begin early on, despite low bandwidth, in the background rather than at the last stage of the process.
- Rural connectivity constraints were managed by addressing protocols and existing network strength, for example. Reconfiguring the technological and payments processes was designed to enable KCL washing station staff members to integrate digital payments into the existing and familiar process for cash payments. Farmers who opt for a split payment (partial cash and mobile money payment), as many are likely to, would wait the standard 20–40 minutes for cash, which allows ample time for

the digital transaction to clear and be confirmed on their phones. When tested, both washing station staff and KCL management enthusiastically supported this approach and plan to introduce it in the 2017–2018 season.

Engaging farmers on their financial strategies

A second area of research centered on understanding and engaging farmers' financial strategies. Individual interviews and initial prototyping showed that farmers responded well to facilitated small group discussions on money management, including savings and planning mechanisms. This approach helps to inform stakeholders on adjustments to render products and services more relevant to farmers and to encourage behavior change to favor DFS. Various options are being evaluated to support farmer financial awareness and other ideas that could strengthen demand for financial services.

Merchants: Creating a pull for mobile money

IDEO.org experimented with creating a demand for electronic money by setting up a mobile-money only pop-up shop that offered goods, including agricultural inputs, in a rural location. The availability of goods nearby, offered at reasonable prices, prompted people to load and use electronic value to procure goods. While these types of innovations provide insight into merchants supporting electronic payment growth, issues about scale and sustainability remain unanswered.

IDEO.org will develop these and other tests during the third season to support farmer demand and use of DFS.

VII. LESSONS LEARNED: HINDSIGHT IS 20/20

Agricultural payment digitization is a long-term investment

The MM4P program initially expected the KCL digitization project to run from 2014 to 2016. However, when it comes to agricultural payments a 2–3-year window might be too small. Establishing rural infrastructure, ensuring that different components of the DFS ecosystem exist and are synchronized, and supporting consumer education and behavior change is a medium-term effort at best. In hindsight, MM4P believes it should have planned for 4–6 years. As a corollary, KCL maintains that it often works with farming communities for at least four years before innovative farming practices are widely adopted. Additionally, similar efforts in the Colombian coffee value chain, possibly the first attempt globally, took seven years to mature (BFA 2015).

Agriculture value chain digitization requires both time and capital. Depending on the agriculture value chain and local context, a donor or agricultural exporter looking to digitize a value chain will need to consider both time and funding. In the process of digitizing the KCL coffee value chain in Kapchorwa and Manafwa, UNCDF invested over \$400,000 into the project, most of which was a direct expense for the Booster Team.

The Bill & Melinda Gates Foundation contracted consulting firms Vital Wave and IDEO.org separately for this project. While Vital Wave had a multi-year contract with the Gates Foundation for this project, IDEO.org was contracted only in the third coffee season.

Strategic partnerships are key in agriculture value chain digitization—it is hard to go it alone

At the onset of the project, the MM4P program initially expected to partner with

two key players: (i) KCL, the agricultural exporter, and (ii) MTN, the digital wallet provider. However, as evidence of a poor infrastructure and the need for education of both KCL staff and the farmers emerged, the number of partners in the project grew to seven (KCL, MTN, Yo! Uganda, Fenix, Portbell Ltd., Vital Wave, and IDEO.org).

The rural setting, the low penetration of mobile money agents and phones, and poor telephone connectivity required several partnerships to build a foundation that would help make digital payments frictionless. Despite the lack of basic infrastructure, around **16 percent of targeted farmers had already signed to receive part of their payments in mobile money**. More farmers are expected to join the initiative by the end of Season 3 in February 2018.

Other lessons learned included understanding the motivation of implementing partners—for example, KCL sought to drive sustainability and saw increased incomes among its farmers as a key driver to a sustainable quality coffee supply. It invested heavily in improving farmer knowledge and sought to improve access of quality inputs for farmers—thus leading farmers to have access to financial services. This was an important part of for KCL's ultimate goals. KCL was patient during this initiative because it was investing in its long-term goals. Not all commodity buyers will have an appetite for this long-term approach to ecosystem sustainability. In these early days of digitization efforts, it is critical to have partners who are invested for the long term and for the right reasons.

Context affects investment and outcome

Geography and type of agriculture value chain were important aspects to consider in this initiative.

Geography. The KCL project was conducted in the rural communities of Kapchorwa and Manfwa. **Rural deployments mean facing greater barriers that need greater financial investment and they experience slower uptake.** Poor telecommunication infrastructure and network connectivity, low levels of financial literacy, low consumer awareness, nonexistent financial service access points, and low mobile handset penetration were a few of the challenges this project faced.

Programs committed to rural access and uptake of DFS must be prepared to address myriad constraints. Rural areas are among the most challenging environments to implement technological solutions. Programs with short timeframes might want to consider focusing on peri-urban populations, which would allow for cost savings, because phone ownership, network connectivity, literacy, and agent networks are relatively stronger in peri-urban areas.

Agriculture value chain type. Not all agriculture value chains are the same. For example, a coffee value chain can be very different from that of tea, as MM4P discovered. In the coffee value chain, typically most farmers own their land and live on or close to it. In contrast, most tea plantations hire “tea pickers” who are often migrant laborers who are eager to adopt digital payments because they want to remit money home to their families. Given the otherwise unreliable and expensive alternative methods of sending money home, digital payments offer an immediate and compelling value proposition to these laborers. The type of agriculture value chain and payee matter (Craib 2017).

Technology is often the easiest part of payment digitization

As noted, Yo! Uganda’s payment platform was ready for deployment by the

first coffee season. However, the DFS ecosystem, value proposition, and user experience that were needed for mobile money payment uptake and adoption were missing. In the next two iterations of the initiative, MM4P, KCL, and other partners have been building solutions and processes that answer the following questions:

- **Is it easier for KCL staff to disburse digital payments than cash payments?** The initial answer was no. KCL staff had to stop their routine coffee cherry procurement and weighing process and power up computers to access the digital payment platform to make a digital payment, making digital pay-outs much more inconvenient when compared to making cash disbursements. Because of this, KCL staff did not encourage digital payments. Today, based on the recommendations by IDEO.org, MM4P and KCL are piloting a more user-friendly procurement-linked payment process that is convenient for KCL staff.
- **Are farmers able to accept mobile money?** This question relates to mobile phone and connectivity penetration. While individual mobile phone ownership is still low among KCL’s farmers, the first test site in Kapchorwa has mobile phone connectivity as a direct consequence of this project.
- **Are farmers aware about and do they understand digital payments?** The Booster Team was a significant result of this project. During the second coffee season (July 2016–February 2017), the acceptance of mobile money among KCL farmers grew. This is attributed, in large part, to the Booster Team’s efforts. The team bridged the gap between agent and customer acquisition, farmer access, registration, and knowledge about mobile money.

- **Is there a good quality, liquid cash-in cash-out network?** It is nearly impossible to digitize agricultural payments via mobile money without financial access points. Hence, MM4P and MTN worked with Potbell Limited and Yo! Uganda to establish a good quality agent network.
- **Is there a compelling value proposition for digital payments?** If the spend economy (payment of everyday goods and services) is cash-based, it is impractical to store money digitally. The Booster Team is working with MTN on merchant acquisition, to digitize the everyday expenditures of KCL farmers, thus eliminating the need to cash-out funds.
- **How should price sensitivity of low-income consumers be addressed?** Traditional mobile money business models use transaction-based pricing (i.e., the customer pays for every transaction, except a cash deposit). Additionally, it is extremely expensive to cash out small-value transactions. For example, a \$4 cash-out costs around 4.7 percent or 19 cents—for a farmer who lives on less than \$2 a day, that is nearly 10 percent of his or her daily income.

Digital payments in rural areas may require untraditional business models

Before the KCL project, MTN Uganda had not tested the concept of temporary base stations in rural areas. The traditional modeling technique of accounting for permanent base-station placement, proximity tower saturation,

and population density to determine demand and subsequent profits proved insufficient in the case of Kapchorwa—the project’s initial test site. Once the temporary BTS was put up, the tower was over-subscribed, which suggested that MTN was leaving “money on the table” by using a traditional approach.

Additionally, of the 17,000 new MTN customers that the Booster Team recruited, 11,500 were active customers who generated almost 10 percent more in ARPU than predicted. This indicates that while a rural setting might require a “high-touch” customer recruitment model, there are potential long-term gains that can offset this up-front investment.

Pre- and post-digitization efforts are equally important to success

Rural bulk payment programs should prepare target communities—for example, by strengthening agent networks and mobile money literacy among target groups, and conducting market research for product development—before launching digital bulk payments. Likewise, program designers should use marketing tactics such as digital ambassadors, client education, and peer support to generate interest and build confidence in the upcoming digital payments options. Efforts should focus on identifying, training, and preparing local digital ambassadors who will initially work with Booster Teams, and continue to support community engagement with digital platforms (mobile money and or banking) after the teams are disbanded. Digital ambassadors may also play a key role in providing feedback to service providers on product relevance, positioning, pricing, etc.

VIII. CONCLUSION

KCL's digital payments program continues today, with stakeholders introducing improved payment experiences and competitors. KCL farmers are beginning to benefit from improvements in DFS, as are community members surrounding the coffee washing stations. Private sector providers such as Yo! Uganda and MTN Uganda have learned from the initiative and use this knowledge to introduce digital payments in new agriculture

value chains. Competitors have taken note, and this has led to greater interest and involvement in serving rural areas with digital payments and financial services.

MM4P Uganda has taken the lessons learned from its first attempt at agricultural payment digitization and has used them to accelerate payments among other value chains.

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X. ANNEXES

1. MTN mobile money P2P and cash-out fees (1 USD = 3500 UGX)
2. The role of UNCDF

In this project, UNCDF served as a convener and project advocate. Project stakeholders agreed they were unlikely to have convened, worked together effectively, and remained together had it not been for UNCDF's coalition-building efforts, technical guidance, financial support, and advocacy.

UNCDF built relationships with each partner to understand organizational incentives as well as the operational constraints that may interfere with implementation. UNCDF worked with partners to design a business case, set

performance objectives, and provide support where required. For the most part, UNCDF financed innovation intended to benefit not only this specific implementation, but the digitization of agriculture value chains, as a whole. UNCDF invested in KCL's technological platform to implement digital payments, including functionality-related coffee price per kilograms and payment tracking whether digital or cash, underwrote a guarantee fund that led to the establishment of a mobile BTS and spurred innovation around mobile phone ownership for women. The Booster Team served not only as a donor facilitator, but also a thought partner and collaborator in designing solutions to implementation bottlenecks.

TABLE A1. Transaction tiers (in UGX)

Min	Max	Sending money to		Cash-out Fees
		MTN mobile money users	Unregistered users	
500	2,500	250	830	330
2,501	5,000	500	940	440
5,001	15,000	1,000	1,880	700
15,001	30,000	1,000	1,880	880
30,001	45,000	1,000	2,310	1,210
45,001	60,000	1,000	2,310	1,500
60,001	125,000	1,600	3,325	1,925
125,001	250,000	1,600	4,975	3,575
250,001	500,000	1,600	7,175	7,000
500,001	1,000,000	2,000	12,650	12,500
1,000,001	2,000,000	2,000	22,000	19,800
2,000,001	4,000,000	2,000	37,400	35,200

TABLE A2. Bulk payment decision sequence overview

Step	Choose payment service provider (PSP)	Assess system needs	Design payment system	Determine infrastructure needs	Procure equipment	Design internal payment procedures	Train staff	Recruit farmers	Assess agent network and recruit agents
Description	Analyze and describe business needs	Assess payer needs (e.g., low-literacy users who need to make payments; offline usability; power needed to run PCs and printers; and need for paper receipts)	Design system and conduct user acceptance testing (e.g., test with low-literacy users) This step can be done only with a payment aggregator; MNOs do not customize their services	Determine if mobile network signal is sufficient and address with MNO Determine how much power is needed to run PCs, printers, other equipment (potentially install new source, potentially solar)	Based on assessed needs (e.g., rugged printers) procure system-compatible PCs, printers, and internet dongles Install and test software, network connection, power source	Determine who can authorize, approve, and initiate payments to ensure good stewardship of funds and reduce risk Determine how long funds transfer takes; establish process to ensure adequate funds are always available	Train KCL central office and washing station staff to use payment platform (Some washing station staff had never used a PC; all were successfully trained. Training required on-site support for 3+ weeks at the washing stations)	Publicize the availability of mobile money and benefits of uptake Solicit feedback from farmers on mobile money Seek to work with MNOs to address challenges (e.g., pricing, which may or may not be possible)	Determine agent availability, and agent liquidity (farmers identified this early on) Recruit agents as necessary, and ensure liquidity management (this required the introduction of a third-party liquidity management firm)

(Continued)

TABLE A2. Bulk payment decision sequence overview (Continued)

Step	Choose payment service provider (PSP)	Assess system needs	Design payment system	Determine infrastructure needs	Procure equipment	Design internal payment procedures	Train staff	Recruit farmers	Assess agent network and recruit agents
					PCs chosen because they mirrored the cash process in the office, they could be more easily secured, and they were more rugged. Tablets will introduce a different modality that does not require going into the office				
Involved	KCL, UNCDF, Vital Wave	KCL, Yo! Uganda, Vital Wave	KCL, Yo! Uganda, Vital Wave	KCL, UNCDF, MTN, Yo! Uganda, Vital Wave	KCL, UNCDF, Yo! Uganda, Vital Wave	KCL, Yo! Uganda, Vital Wave	KCL, Yo Uganda	KCL, UNCDF, Yo! Uganda	KCL, Yo! Uganda, MTN, Potbell