

Unlocking Rural Digital Finance with Solar Energy

An expansion of M-KOPA's
pay-as-you-go solar model
enables rural farmers to
access investment capital

Summary

M-KOPA provides its rural customers with affordable and accessible credit services to meet their most pressing needs. FRP funding has led to over \$4m in credit delivered to rural Kenyans for productive assets between mid 2016 and July 2019.

Described as a “killer app” for financial inclusion by FSD Kenya, M-KOPA’s innovative solution combines mobile connectivity and smart data to open a line of credit for underserved, rural Africans. For the first time, customers are able to access capital to purchase assets that increase productivity, profitability and resilience.

M-KOPA

M-KOPA, the global leader in pay-as-you-go (PAYG) solar energy, makes clean energy affordable for low-income, rural Kenyans and Ugandans. Customers make a small down-payment on a solar energy system and pay the balance over time using mobile money transfers. Our model bypasses the need for established credit history by embedding GSM technology that allows the solar system to be remotely controlled in times of non-payment. The company has brought clean solar lighting to over 750,000 customers, who save, on average, \$650 over the lifetime of their systems by displacing the need to buy kerosene for their daily lighting needs.

Many rural Africans lack access to energy and financial services, which reduces productivity and profitability and increases vulnerability to unforeseen difficulties. This means that providing access to both services enables customers to:

- save money by displacing expensive, carbon-based fuels such as kerosene for lighting,
- earn money by using their solar home system (SHS) for productive activities,
- build a credit history that unlocks additional credit through M-KOPA or the Credit Reference Bureau to invest in smallholder farming activities, micro and small businesses, as well as borrow for domestic purposes e.g. covering school fees for children.

Challenges and opportunities for rural digital financial services

This paper provides a case study that examines the benefits of a connected-asset financing company, such as M-KOPA, providing a range of credit services to support rural livelihoods’ in respect of: clean energy access, wider household needs, agriculture and small enterprise. It tells the story of the iterative processes involved in developing and deploying credit services to rural customers.

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Why is agricultural input credit important to M-KOPA customers?

M-KOPA (M = mobile, KOPA = borrow in Swahili) has provided loans for solar home systems (SHS) to over 750,000 low-income households, the majority of whom live in rural Kenya, Uganda and Tanzania. When customers complete repayment, they own the SHS and clean energy is free. They can then use their trusted relationship with M-KOPA to access more credit and buy additional products by remotely re-securing their SHS as collateral. Many customers wish to purchase energy products such as TVs, whilst others require support for farming, rural micro and small enterprises, or to cover other pressing needs, such as school fees. Indeed, it is clear that customers' financial demands are not solely energy-related, and M-KOPA's secured-asset credit approach can address a spectra of needs.



Figure 1: importance of agriculture in African economies

Agriculture is the backbone of East African economies and is a primary source of livelihood and food security. In Kenya, the sector employs about 40 per cent of the population, and 70 per cent of rural residents¹. As a business that targets rural populations, a significant percentage of M-KOPA's customers are dependent upon agriculture for income (76 per cent). Evidence from internal research shows that over 90% of M-KOPA's farmer customers are smallholders².

Numerous studies suggest that access to credit for agriculture can positively impact smallholder income levels³ PIF P. Yet these farmers are often ineligible for conventional credit due to inconsistent revenue flows, even when income is supplemented by non-farm activities⁴. The recent rise of digital credit services may partially address this gap, especially in Kenya, but these newly available loans have high interest rates, inflexible repayment terms and low outreach – punitive terms for low-income Kenyans⁵.

¹ FAO, Kenya at a glance (2018)

² See phone survey results under Product concept development and testing

³ "Evidence on the Impact of Rural and Agricultural Finance on Clients in Sub-Saharan Africa: a Literature Review" EPAR Brief No. 307 / Learning Lab Technical Report No. 2 Chris Clark, Katie Panhorst Harris, Pierre Biscaye, Mary Kay Gugerty, & C. Leigh Anderson

⁴ CGAP, Smallholder Diaries, (2016)

⁵ M-KOPA cash loan surveys – CGAP, Kenya's Digital Credit Revolution Five Years On (2018) – FSD Kenya, Digital credit in Kenya: evidence from demand-side surveys (2018)

Designing rural digital financial services

M-KOPA gained support from the MasterCard Foundation's Fund for Rural Prosperity (FRP) to test and scale flexible digital financial services. Starting in Tanzania, FRP support focused on two initiatives:

- Building a rural distribution footprint in the Southern Highlands region of Tanzania to extend access of M-KOPA's anchor solar home system loans. FRP helped M-KOPA and its partner Vodacom to test new sales and distribution models and expand availability of kerosene-displacing solar home systems
- Scaling up provision of loans for agricultural purposes to existing solar energy customers. These loans would be tailored to customer circumstances following further market research and promoted using distribution partners such as input suppliers.

M-KOPA hypothesised that providing smallholder farmers with additional financial services, at the right time and price, can counteract financial instability and support productivity. With FRP's support, M-KOPA is now scaling up a range of financial services targeted at rural customers in Kenya and Uganda.



28% of customers used M-KOPA cash loans to acquire agricultural input, including livestock, in 2018

36% of customers used M-KOPA cash loans to invest in micro and small rural enterprises in 2018

21% of customers used M-KOPA cash loans to finance children's school fees in 2018

Challenges of last-mile distribution

Tanzania is a vast country, with characteristically weak infrastructure, under-developed market systems and limited availability of distribution. To reach remote, off-grid communities, M-KOPA sought to examine a series of distribution models to sustainably scale in this challenging environment. Over 15 months, M-KOPA issued over 41,000 loans for affordable solar systems, representing over \$9m in loans.

We initially partnered with organisations already in reach of smallholder farmers, such as village community banks, and agreed to launch SHS sales through their established rural networks. However, it quickly became clear that, although these organisations were focused on the financial needs of rural Tanzanians, the divergent approach to market, sell and provide post-sales support for PAYG solar did not match partners' core competencies. As a result, the partnership model was refined to focus on a relationship with Vodacom, the dominant mobile network and mobile money provider in Tanzania.

This involved the establishment of Vodacom Rural Service Desks – a new outlet that Vodacom piloted with the singular aim to provide reliable energy to customers for clean lighting and phone-charging. In this model, Vodacom franchisees with existing rural outlets acted as M-KOPA direct sales agents, displaying demonstration products in stores, and provided as a trusted touchpoint for off-grid Tanzanians adopting this new technology – with much success in accelerating energy access.

M-KOPA also trialed a Roaming Service Centre (RSC), in which scouts in remote communities aggregated sales through the collection of partial deposits and reported back to M-KOPA. The RSC then delivered products and completed sales in batches to communities and provided customer care services, too. This approach required careful planning in advance yet allowed M-KOPA to deliver SHS more efficiently and improve the customer experience with on-site support.

Looking beyond the immediate need to provide clean solar lighting systems to unlock consumer financing, M-KOPA undertook detailed market and customer needs analysis for various agricultural credit products and developed partner initiatives to test agricultural credit loans. These partners, such as rural agrovets and hardware stores, had an extensive rural presence and were accessible to M-KOPA's target customers. However, the deteriorating business environment for PAYG credit sales in Tanzania (to the mass-market of low-income rural customers given severe macro-economic conditions) meant that M-KOPA was obliged to cease new sales at the end of 2017. This halted the sales of additional credit products in Tanzania and consequently, the focus of the FRP funded product scale-up moved to Kenya and Uganda.

Defining customer financial needs: a framework for entrepreneurs

Following repayment of the anchor solar home system, M-KOPA offers its customers a range of credit products, including cash loans (SolaPesa) and electronic vouchers (eVouchers) for agricultural inputs. By August 2019, M-KOPA issued tens of thousands of cash loans and several hundred eVouchers, with a cumulative value of US\$4 million.

However, M-KOPA had to prove several commercial and credit factors before offering these digital financial services on a large scale, including:

- demand amongst existing customers,
- benefit to customers relative to price, while avoiding unnecessary indebtedness,
- commercial viability (recognising the low margins associated with agricultural input sales) and suitable repayment rates,
- interest of third-party agricultural input providers for appropriately priced goods,
- redesign of platform architecture and sales processes to offer services cost-effectively.

To achieve this, M-KOPA engaged in a long-term product development process⁶ involving several stages since 2016:

- concept development and customer testing,
- prototype testing,
- iterative product design based on customer feedback,
- final product definition, and
- preparation for commercial roll-out.

The subsequent sections of this paper recount these stages and provides a framework for other social entrepreneurs to market digital services that address rural consumer needs.

Concept development and testing

Kenya has a diverse agricultural sector. To understand where agricultural credit loans would be most impactful, M-KOPA mapped popular crop varieties relative to smallholder farmer density and its existing customer base, bearing in mind factors such as input requirements, value chain strength, and primary stakeholders in those value chains.

M-KOPA then conducted surveys and focus group discussions to define smallholder farmers' key financial needs. A preliminary survey amongst M-KOPA customers (n=200) unearthed a better understanding of circumstances relating to agriculture, showing that:

- 96% of M-KOPA customers own or rent a plot of farmland and/or own livestock,
- 91% have less than five acres of land,
- 70% earn less than KES 20,000 per month,
- 87% cultivate maize, followed by legumes (60%) and fruit and vegetables (38%),
- 63% own chickens or at least one dairy cow.

The focus group discussions further contextualised farmer needs and unveiled strong appetite to purchase poultry and dairy products on credit, as well as horticultural input bundles. They also measured the demand for water tanks for agricultural and household purposes. It was the one-to-one interviews, however, that revealed fertiliser to be the most commonly used input and an agricultural priority. Thus ensued M-KOPA's three-year journey to test the design and delivery of loans for each of these products (except dairy) and scale the most successful: fertiliser and water tanks.

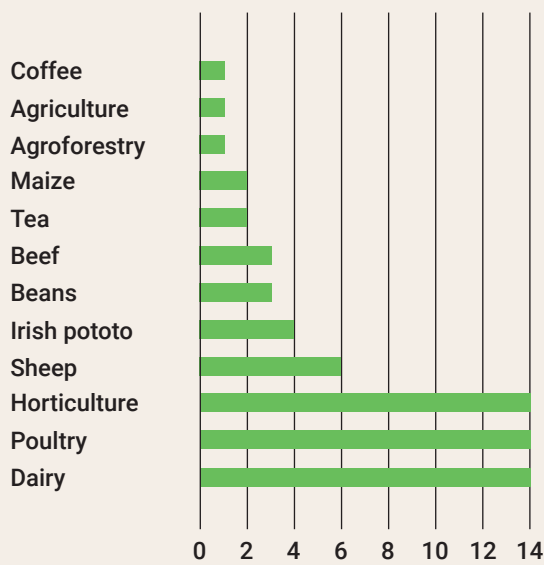
This paper will focus on of the successive prototype iterations that led to the development of eVouchers and cash loans.

⁶ The initial product concept testing and development was supported by FSD Kenya, whereas sales in Kenya from 2018 onward and further product development iterations were supported by the FRP.

Defining customer financial needs: a framework for entrepreneurs

Chart 1: Pilot product selection process

Top agricultural financing needs quoted during focus group discussions



If you had KES 20,000 worth of agricultural credit to spend, what would you spend it on?

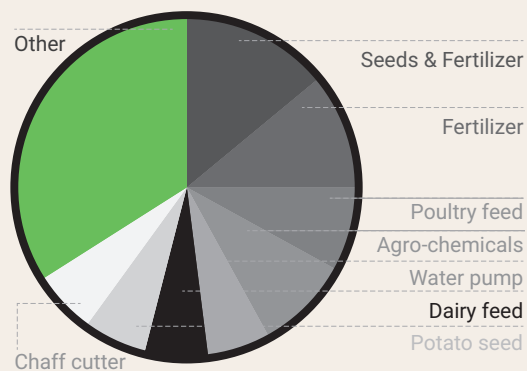


Figure 2: M-KOPA customers during a focus group discussion in Burnt Forest

Defining customer financial needs: a framework for entrepreneurs

Fertiliser

In Kenya, smallholder maize farmers dedicate over 50% of budgets to fertiliser. Despite this investment, average maize yields are not optimal due to insufficient usage of fertiliser.

In 2016, Kenyan farmers used less than 40 kilograms of fertiliser, on average, per hectare. By comparison, farmers in The Netherlands use close to 290kg on the same surface area⁷. To tackle this inefficiency, the Kenyan government provides subsidised fertiliser, but only a small fraction of smallholder farmers benefit due to limited supply. One consequence is the significant maize gap – estimated at 1 million metric tons – between the current maize production level and the target production. The key challenges farmers face in purchasing this input include:

- inability to save previous harvest incomes for next year's season⁸,
- exposure to steep price fluctuations ahead of the planting season, and
- no access to credit to purchase fertiliser at time of planting.
- Importantly, fertiliser is used for a variety of crops, suggesting ample opportunity to support smallholder farmers across the country.

Water tanks

Customer consistently water tanks are a valuable asset for smallholders, storing water for household consumption, livestock and, in some cases, irrigation. Yet water tanks require a significant upfront investment with additional costs for delivery to remote and poorly connected locations, making it difficult for them to attain. For the subsequent trial, M-KOPA used location data to improve customer selection based on proximity to warehouses to explore warehouse-to-door delivery options.

7 Knoema, Kenya - Fertilizer consumption per unit of arable land; Netherlands - Fertilizer consumption per unit of arable land

8 Duflo, Kremer, Robinson, 2011

9 M-KOPA Survey, 2017, n=50

Prototype testing

M-KOPA ran a series of small pilots for all the shortlisted products to assess feasibility, scalability and customer appetite. Early market tests quickly revealed that the poultry package and horticultural bundles are complex to implement and require more oversight than M-KOPA can provide as an asset-backed financing company. This fail-fast approach to product testing led to fertiliser and water tanks larger scale market tests and informed our understanding of customer needs.

Fertiliser

In one month time, M-KOPA partnered with ETG, Kenya's largest fertiliser distributor, to provide 140 existing customers with fertiliser sold on a credit basis.

The pilot exceeded the initial KPIs:

- Demand for fertiliser surpassed target by 1.1%.
- Average loan repayment rate was 78%, comparatively higher than similarly priced products sold by M-KOPA.
- Over 96% of customers expected a higher yield output as a result of fertiliser use⁹

Survey results and field visits showed that fertiliser loans allowed customers to:

- plant a greater area of land than would otherwise be possible,
- fertilise more crops than would otherwise be possible – increasing yields as a result, and
- free up saved cash to invest in other productive assets such as livestock, which generate short and long-term incomes.

These strong, positive indicators merited a close examination of the commercial case to scale this offer. At its core, M-KOPA is a consumer finance lender, skilled in the provision and delivery of affordable credit to low-income, rural farmers. Distributing fertiliser at a small scale was feasible for pilot purposes, but not sustainable in the long-term. In order to scale, M-KOPA would have to find a partner that could manage inventory, as well as offer acceptable payment terms for high-volume orders with a buy-back policy for unsold inventory.

Defining customer financial needs: a framework for entrepreneurs

Water tanks

M-KOPA trialled selling water tanks to its existing solar customers, inclusive of direct delivery to doorsteps. The first 50 customers deposited between USD \$10 to \$20, but this condition was later removed, leading to an additional 50 sales in two weeks. Repayment performance was very strong compared to other secondary loans offered by M-KOPA, and customer surveys reflect why:

- The delivered tanks improved the customers' access to drinking water, eased personal and domestic hygiene, and enabled the irrigation/watering of crops.
- 98% were either satisfied or very satisfied with the overall product and service provided.
- 86% deemed the product to be of a high or very high quality.

One of main difficulties that M-KOPA wanted to solve, was the timeliness of deliveries. Eighty-two per cent of deliveries were made within 21 days, showing that while the delivery process works, additional effort was necessary. Regardless, direct delivery was a key benefit that customers repeatedly highlighted. For a typical M-KOP customer, the sole cost of transporting a tank from a shop to their home can be prohibitive. However, bulk orders enable M-KOPA to pass on a lower delivery cost to the customer, compared to what they would have paid on their own.

“ When they called about fertiliser, I saw it was right for me because of the flexible repayment. That’s when I expanded and planted two more acres”

Benjamin Kipyego Kogo

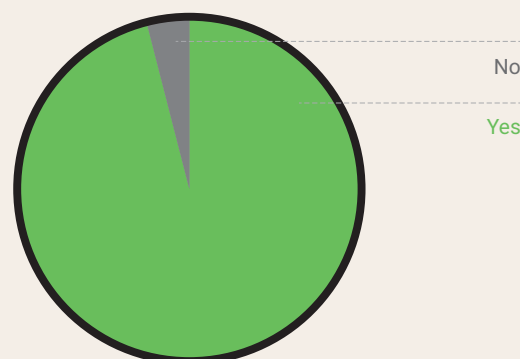
Box 2:

Improving yields with fertiliser loans

Fertiliser pilots resulted in very high approval ratings due to the quality of fertiliser provided and ability to invest in farms without punitive loans terms. Almost all customers noticed an increase in yields, which they attribute to fertiliser purchased on loan.



Do you think this product will help you have better yields than if you hadn't purchased it?



Sample size = 50

Defining customer financial needs: a framework for entrepreneurs

Iterative product design

Re-testing fertiliser

With FRP support, M-KOPA tested fertiliser loans on a much larger scale with a new fertiliser supplier, who acted as collection point for customers and offered attractive terms to manage inventory and logistics – critical functions to the success of this venture.

Within three months, approximately 700 customers purchased 100 tonnes of fertilizer – a five-fold increase over the previous test. The impact of the loans was measurable: 93% of customers were satisfied with the provided fertilizer and 85% noted the fertilizer helped increase yields.

Despite the apparent benefit to customers, commercial and logistical hurdles challenged the scalability of fertilizer loans. Repayment performance proved less than expected, explained by the fact that many customers leveraged their 'depreciated' (2-3 years old) solar systems to secure new loans. Equally, the management of logistics, again, proved time-consuming and demonstrated the importance of capable, specialised partners. This supported the case for an eVoucher product that would fully transfer the inventory burden to the distributors.

Re-testing water tanks

In six months M-KOPA sold nearly 500 tanks, testing the viability of the delivery model on a larger scale. The main challenge to scale this offer relate to the timeliness of deliveries to customers.

“ I needed to save for up to two months before buying fertiliser. [...] Now that M-KOPA offers fertiliser, I will [use my cash savings to] buy sheep and the rest I can use to pay for school fees”.

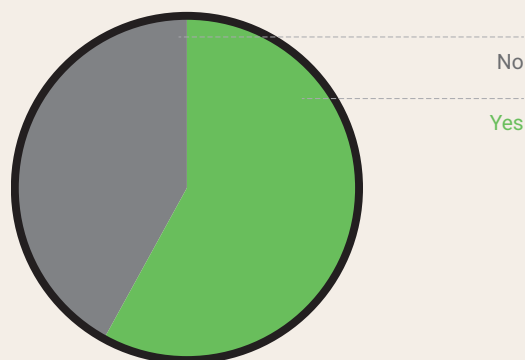
Juliana Jepkosgei Serem

Box 3:

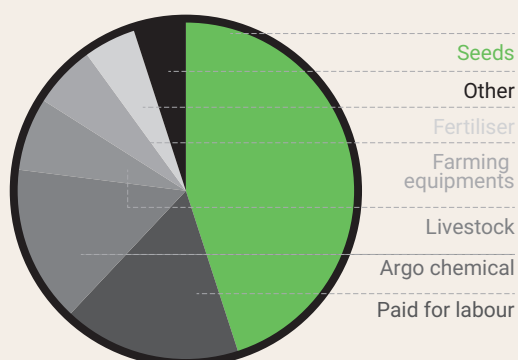
Freeing up savings through credit

Customers report availability of fertilizer loans frees up savings to invest in other productive assets.

Has this loan allowed you to purchase other agricultural products?



If yes, which ones?



Sample size = 201

Defining customer financial needs: a framework for entrepreneurs

Final product definition

Based upon the early stages of product development and a series of market tests, M-KOPA settled on two key product types:

- cash loans disbursed directly to customers' mobile money wallets
- eVouchers that could be redeemed at agrovet shops.

This section describes the process of implementing these new products.

Cash loans for unlimited uses

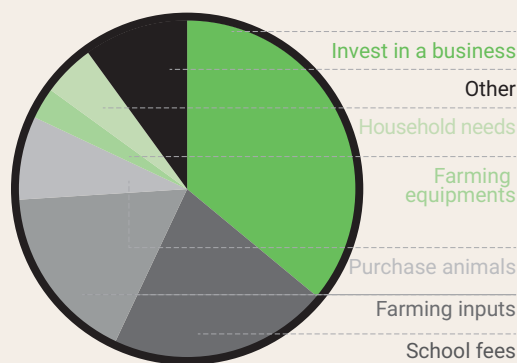
M-KOPA piloted cash loans to existing customers in 2017 and has since delivered more than 50,000 PAYG cash loans, termed SolaPesa (Kiswahili for 'Solar money'), across Kenya and Uganda. The key customer benefit is flexibility: cash is not limited to a network of agrovets and arguably better meets business, agricultural and household needs. As a digital offer, these loans alleviate the logistical burden of physical goods, such as fertiliser, water tanks, cook stoves and smartphones. No collateral is demanded, but the customer's device functionality can affect timely repayment of their loan.

The initial pilot ran in parallel to the fertiliser and water tank offerings, achieving over 4,000 sales in five months. SolaPesa is now a standard offer for customers who finish repayment for their SHS, but payment plans are regularly adjusted to fit the profiles of different customers and secure adequate repayment rates. Customers are consistently surveyed by M-KOPA's market research team to unpack customers' needs and uses for the loan.

Box 4: Cash loan usage

Ongoing research shows most customers use PAYG cash loans for enterprise, farming, school fees and other household needs.

Cash Loan Usage by 2017 and 2018 Survey Respondents



“ I would not have been able to buy more chickens without the cash loan from M-KOPA.”

Grace Nzilani Musyoki

Defining customer financial needs: a framework for entrepreneurs

eVouchers for easier, select buying choices

The idea for closed-loop digital eVouchers, redeemable at local retailers for a wide range of products, was born from the lessons learnt in previous stages:

- Challenging delivery logistics and inventory management for bulky items underlined the importance of focusing on M-KOPA's core competencies: sales and credit
- Customers demanded greater freedom of choice in the products offered and access to local retail points

Additionally, the closed loop nature of this solution allows M-KOPA to maintain control over the type of redeemable products, by carefully selecting partner merchants. In this case, credit cannot be redeemed for what might be seen as less valuable purposes, such as gambling. Importantly, M-KOPA believes the financial benefits of a closed-loop digital solution will avail more transparent and discounted prices on agricultural inputs for low-income farmers.

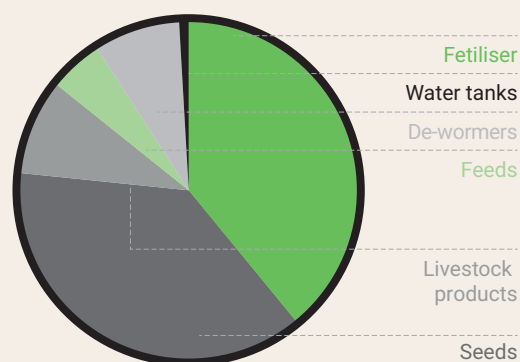
M-KOPA initiated the development of the eVoucher MVP with a Kenyan technology partner. As well as providing the platform for eVoucher generation, this partner registered merchants, selected by M-KOPA, onto its platform and trained them to redeem vouchers via a smartphone app. The partner also provided M-KOPA staff with access to its dashboard and trained telesales agents to generate digital vouchers.

eVouchers are currently redeemable at nine agrovets throughout Kenya and more than 640 vouchers have been sold over nine months. Repayment rates show strong promise and are monitored closely.

Box 5: eVoucher redemption

eVouchers offer full visibility on the type of items bought, ensuring credited is spent in a tractable closed loop.

Products redeemed with eVouchers (volume)



Defining customer financial needs: a framework for entrepreneurs

Commercial roll-out

SolaPesa is now a mainstream M-KOPA digital financial service offered on the back of customer's owned solar systems. Frequent surveys show that many customers prefer SolaPesa to other cash loans in the market, due to its more flexible repayment terms which makes it suited to low-income customers. Moreover, SolaPesa loans are consistently used for productive purposes such as farming, micro and small businesses, and school fees.

Nevertheless, SolaPesa payment plans are regularly refined to fit customer lifestyles, with the goal to prevent over-indebtedness and high default rates.

With promising initial results, eVouchers are offered to existing customers in areas with a participating agrovets in Kenya. However, full scale-up requires additional product development including:

- Refining the voucher technology to enable faster, smoother operations for M-KOPA and its partner's merchants,
- Identifying distributors with a network of rural outlets, and
- Differentiating the voucher offer from the cash loan to avoid cannibalisation.

As M-KOPA advances the design of this distinct product, we will explore how to make eVouchers more attractive to end users as well as partners, e.g. by negotiating discounts with partner merchants and further increasing the credit limit of eVouchers (compared to cash loans) to extend the financial benefits to its agricultural customer base. M-KOPA is already in discussions with its technology partners to enhance its offering and launch in Uganda.