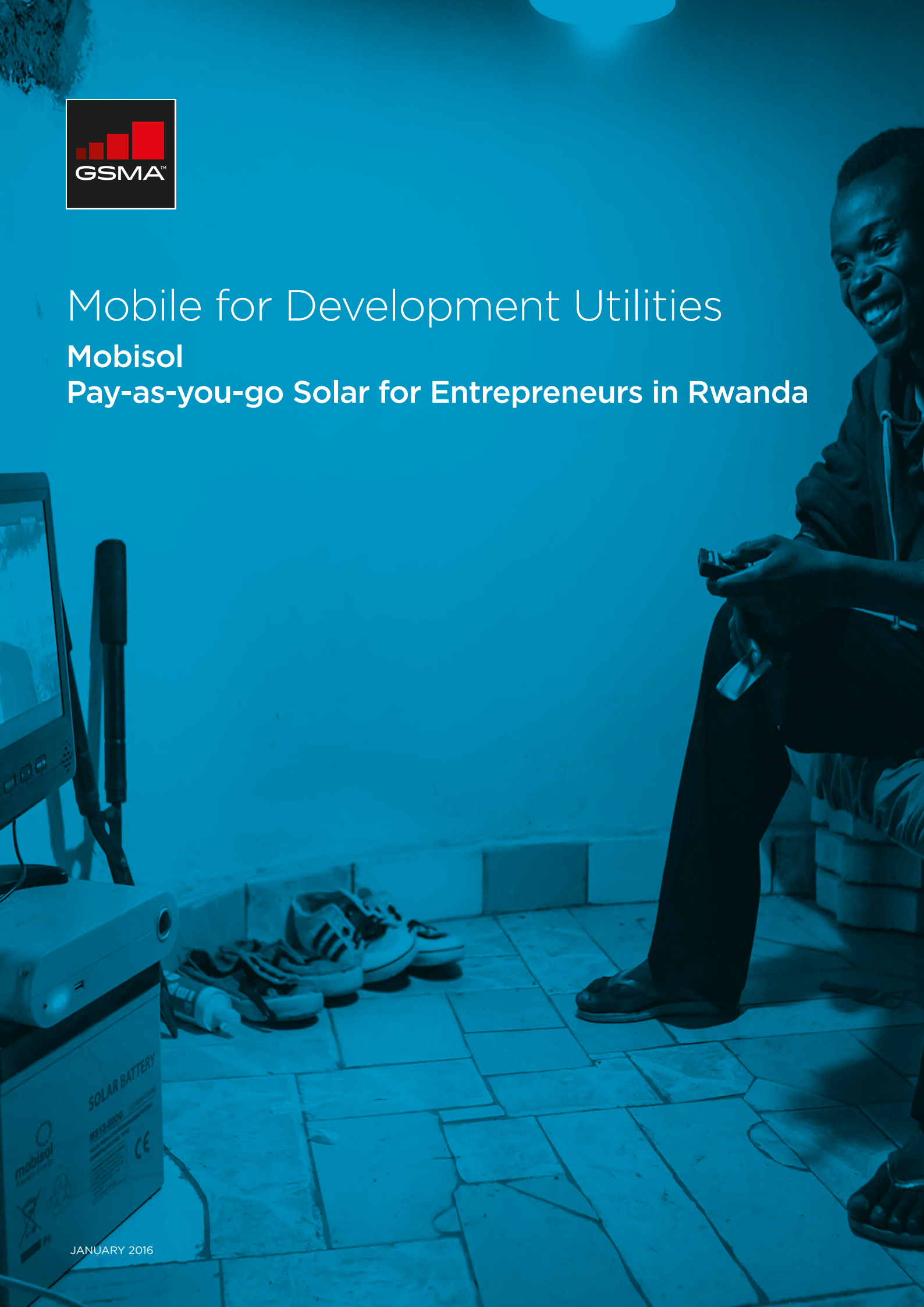

Mobile for Development Utilities

Mobisol
Pay-as-you-go Solar for Entrepreneurs in Rwanda

JANUARY 2016

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai and the Mobile 360 Series conferences.

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Mobile for Development Utilities

The Mobile for Development Utilities Programme promotes the use of mobile technology and infrastructure to improve or increase access to basic utility services for the underserved. Our programme focuses on any energy, water or sanitation services which include a mobile component such as mobile services (voice, data, SMS, USSD), mobile money, Machine to Machine (M2M) communication, or leverage a mobile operator's brand, marketing or infrastructure (distribution and agent networks, tower infrastructure). The Programme receives support from the UK Government.

Author: Ilana Cohen

The Innovation Fund

The Mobile for Development Utilities Innovation Fund was launched in June 2013 to test and scale the use of mobile to improve or increase access to energy, water and sanitation services. In two phases of funding, grants were competitively awarded to 34 organisations across Asia and Africa. Seed grants were awarded for early stage trials, Market Validation grants for scaling or replication of business models, and Utility Partnership grants to foster partnerships between utility companies and innovators.

The specific objective of the Innovation Fund is to extract insights from the trial and scaling of these innovative models to inform three key questions for growing the sector:

- How can mobile support utility services?
- For a mobile-enabled solution to be adopted at scale, what building blocks are needed?
- What are the social and commercial impacts of delivering community services to underserved mobile subscribers?

These insights, as well as grant-specific learning objectives, are included in individual case studies such as this one, as well as thematic reports that will be published throughout 2015 and 2016.

UKaid
from the British people

This document is an output from a project co-funded by UK aid from the UK Government. The views expressed do not necessarily reflect the UK Government's official policies.

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Executive Summary

In November 2013, the Mobile for Development Utilities Programme awarded the Berlin-based company Mobisol, a Market Validation grant to replicate its innovative mobile-enabled energy business in Rwanda, through a partnership with MTN Rwanda. Mobisol offers off-grid customers in emerging markets pre-paid solar home systems paid through a 36-month loan term, including customer support and maintenance. This pay-as-you-go (PAYG) model is enabled by mobile payments and GSM based machine-to-machine (M2M) connectivity in the solar unit to monitor system usage and performance while providing Mobisol remote control.

The key objectives of the grant were to gain insights about replicating the pay-as-you-go solar model in a new market, and to test an additional value proposition: improving customers' ability to pay by offering a lantern and phone charging business kit to generate income from the asset. Mobisol set out to sell 400 of these entrepreneurial systems to customers and learn about the value of this offering to both customers and Mobisol's own business. In addition, Mobisol generated valuable insights on the impacts of solar home systems on customers' quality of life. Key findings include:

Approximately 92% of Mobisol entrepreneurs using the business kit system have completely replaced kerosene, candles and/or batteries with their Mobisol system. Households and shop attendants benefit from cleaner sources of energy without having to travel to purchase them, and a potential decrease in lighting and phone charging expenditure.

Mobisol entrepreneurs can earn approximately RWF 25,000 (USD 35) / month from the phone and lantern charging business, which exceeds the monthly cost of Mobisol's 100W system with the business kit. Additional revenue is likely from the estimated 1.5 additional business hours entrepreneurs kept their other businesses open after dusk with the solar lighting.

Mobisol entrepreneurs make an average of 1.7 payments per month via MTN mobile money for their Mobisol systems, making them very active users in comparison to the industry benchmark for active users of one transaction every 90 days. In total, Mobisol customers made 11,400 transactions via MTN mobile money in 2014, and MTN has granted Mobisol a preferential transaction fee rate for Mobisol payments. Mobisol customers could develop long-term loyalty to MTN services as customers make payments for up to 36 months. Furthermore, Mobisol estimates that 20% of their business kit users are newly registered for MTN mobile money when they become Mobisol customers, and data from MTN suggests that almost all of them are using bill pay transactions for the first time through Mobisol. Finally, Mobisol entrepreneurs increased their purchase of airtime through mobile money by 74% over time, which represents cost savings for MTN in printing airtime vouchers.

Mobisol's business can be successfully replicated in new markets through rapid learning and adjustments to their product, sales, marketing and service model. For example, shifting the size of solar home systems to match the location-specific sunlight availability and customer demand; building standardised training models and evaluation for agents and technicians; and addressing barriers and incentives to support solar entrepreneurs.

A key outcome of the GBP 288,000 grant was that it may have helped to catalyse EUR 22 million of investment, including a EUR 6 million grant to Mobisol, for the company to expand services to an additional 49,000 households and 1,000 schools by mid-2018, working in partnership with the Rwandan Energy Development Corporation Limited. This market expansion demonstrates the ultimate impact intended through the Mobile for Development Utilities Innovation Grant Fund.

Introduction

Since Mobisol's 2012 launch in Tanzania, the company has focused on building robust technical products, a strong service model and rapid market expansion, delivering more than 1 MW of installed solar capacity for over 10,000 households by October 2014. Through this Market Validation grant, Mobisol, in partnership with MTN Rwanda, has tested expansion of their mobile-enabled, pay-as-you-go (PAYG) solar home system business in Rwanda. In response to the country's widespread need for electrification accompanied by limited livelihood possibilities, the company has used the grant to explore the market demand for entrepreneurial systems that can generate income through business kits for charging phones and lanterns.

CREDIT: GSMA

Mobisol service centre in Rwanda

Key Facts about Mobisol

FIGURE 1

Company overview as of December 2014

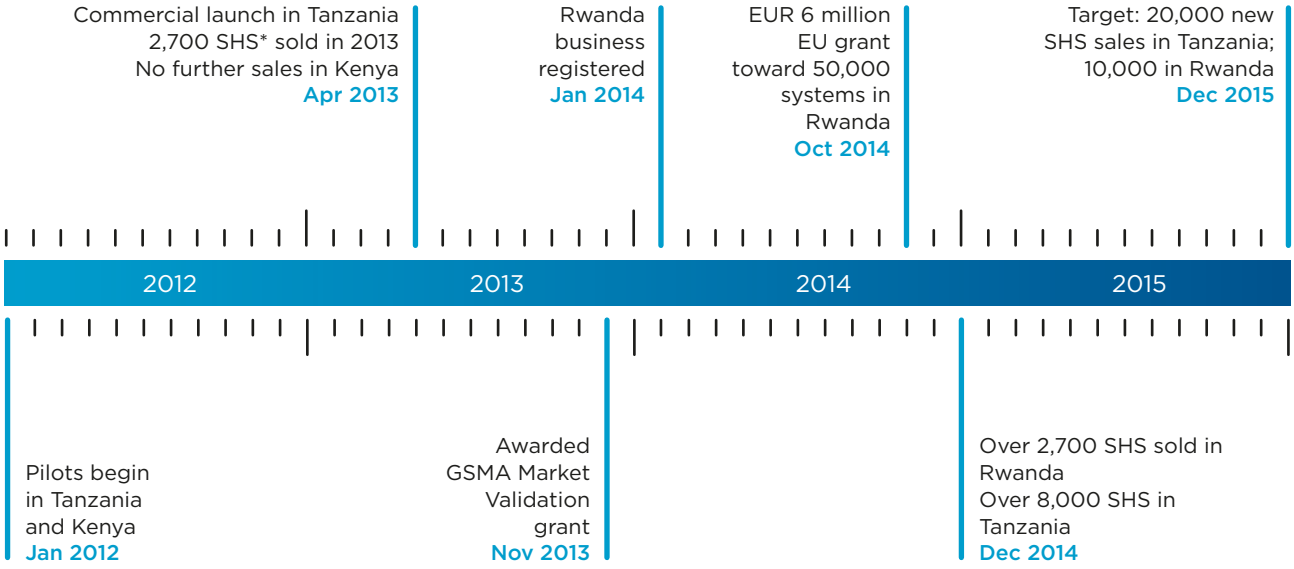
Name	Mobisol
Sector	Energy (Solar)
Year Established	2010
Country Footprint	Tanzania & Rwanda
Product/Service	Pay-as-you-go (PAYG) solar home systems (30W, 100W and 200W) with optional charging business kit and other appliances
Market Segment	Off-grid households and small enterprises
Total Systems/ Customers Served[1]	Rwanda: 2,718 systems total, of which 588 have a charging business kit. Tanzania: Over 10,000 systems. People impacted: Approximately 72,000 people[1]
Use of Mobile: Technology and Partnership	• GSM based machine-to-machine (M2M) connectivity; • Mobile money for customer payments; and • Mobile services for communication (customer care hotline and SMS notifications)

Mobisol's growth timeline is depicted below. In October 2014, Mobisol received a European Union grant of EUR 6 million, matched by private and government investment to total EUR 22 million to support Mobisol and the Rwanda Energy Development Corporation Ltd. to provide 49,000 solar home systems to households and 1,000 to schools in Rwanda by mid-2018.[2]

1. Self-reported by Mobisol, on the basis of an average household size of 5-7
2. http://eeas.europa.eu/delegations/rwanda/press_corner/all_news/news/2014/20141113_1_en.htm

FIGURE 2

Mobisol's Growth



*SHS = Solar Home System

Grant Objectives

The objectives of Mobisol's Market Validation grant were as follows:

- To learn about the requirements to rapidly replicate the solar PAYG business into an unproven market;
- Confirm market demand for larger solar home systems (100W and 200W) with charging business kits to understand the income generating opportunities that could make their product affordable to more customers (reaching a sales target of 400 systems with business kits in 12 months).

The expected learnings for the broader PAYG solar sector, as defined by Mobisol at the outset of the grant were:

1. The amount of revenue solar entrepreneurs can make through lantern and phone charging
2. The impact on customers' mobile phone usage including airtime and mobile money
3. The quality of life improvements from access to a clean and affordable source of electricity

Market Opportunity

Addressable Market

The market opportunity for Mobisol's offering is characterised by Rwanda's low electrification rate of 17%; 5% in rural areas and 67% in urban areas, in comparison to the country's 70% electrification target by 2017.[3] In contrast, over 98% of the 11.7 million population has access to GSM networks.[4] This means approximately 80%, or 9.5 million people, are within the addressable market that could leverage their access to GSM networks in order to receive new models of energy services.[5] The majority of this market is the 73% of the population that live in rural areas.[6] Mobisol targets the emerging "middle class" within the bottom of the pyramid customer segment, or those living on less than USD 2.50/day.[7] Mobisol expects the product to be affordable to this segment by offering incremental income through productive use of Mobisol systems.

Mobile Ecosystem

Although the Rwandan mobile ecosytem is still maturing, mobile money adoption is strong relative to formal banking, enabling Mobisol to use mobile money for remote payment collection. Rwanda's market penetration of unique subscribers is 33.6% of the population, which is on par with the East Africa regional rate of 30.5%.[8] All three mobile operators in Rwanda (MTN, Airtel and Tigo) offer mobile money services, as well as two banking institutions. In 2014, the number of mobile money accounts in Rwanda exceeded the number of bank accounts, a threshold reached by only 16 countries worldwide.[9]

MTN is currently the mobile market leader, with a market share of 51-53% during 2014.[10] MTN was also the first of the mobile operators to launch its mobile money service in February 2010 and has over 2 million registered mobile money users.[11]

Market Assumptions

Mobisol began operations in Bugesera County, based on the following assumptions about their target customers, made as part of their grant proposal:

- 12.4% of households have access to electricity, leaving 47,000 households without access[12]
- The dominant livelihood is agriculture
- Mobile phone ownership increased in Bugesera from 3.6% of households in 2005/6 to 48.4% in 2012 with an estimated total of 45,000 mobile phones[13]

Mobisol also considered the findings from a 2012 GVEP International study of the off-grid market segment. It estimates household spend on energy is from under RWF 500 to 1,500 per week (USD 0.80-2.50) on kerosene or candles and RWF 100-200 (USD 0.16-0.30) per phone charge, indicating a total spend of approximately USD 1.50-2.00/week (USD 6-8/month).[14] Mobisol expected the average household income to be less than RWF 35,000 (USD 50/month), based on World Bank Data.[15]

3. International Energy Agency, Africa Energy Outlook, 2014. http://www.worldenergyoutlook.org/africa/ and Rwanda's Second Economic Development and Poverty Reduction Strategy (EDPRS 2). http://www.unpei.org/sites/default/files/e_library_documents/Rwanda_Economic_Development_and_Poverty_Reduction_Strategy_2013-2018.pdf
4. Rwanda Utilities Regulatory Authority, Annual Report 2013-2014. http://www.rura.rw/fileadmin/docs/report/Annual_Report_2012_2013.pdf
5. GMSA M4D Utilities, 2013. Sizing the opportunity of Mobile to Support Energy and Water Access. Data currently being updated.
6. World Bank Data Bank, 2013. http://data.worldbank.org/indicator/SP.POP.TOTL
7. http://lexicon.ft.com/Term?term=bottom-of-the-pyramid-%28BOP%29
8. GSMA Intelligence, Data for 2014 Q4.
9. GSMA Mobile Money for the Unbanked, "2014 State of the Industry. Mobile Financial Services for the Unbanked." p.26 Agree: http://www.gsma.com/mobilefordevelopment/programmes/mobile-money/insights/industry-reports
10. GSMA Intelligence, Data for 2014
11. Not all of these may be classified as "active" users by the definition of at least one transaction within 90 days. http://www.mtn.co.rw/Content/Pages/349/MTN_Rwanda_introduces_convenient_payment_solution_for_Water_Utility_Bills
12. National Institute of Statistics of Rwanda, 2012, The third integrated Household Living Conditions Survey (EICV3)
13. Ibid, p93 and p158
14. All figures reported from GVEP International "An analysis of the off-grid lighting Market in Rwanda: Sales, Distribution and Marketing." 2012. Exchange rates are those given in the report. http://www.gvepinternational.org/sites/default/files/rwanda-solar-study-v1.6_small4.pdf
15. World bank Data

Mobisol's Business Model

The Value Proposition

Mobisol's business model creates value by offering customers a loan for an energy asset that will replace customers' spend on kerosene, candles, batteries and charging services for lanterns and mobile phones. These energy assets also provide higher quality lighting, more reliable service and the convenience of an in-home solution. An additional value proposition beyond loan asset financing is the charging business kit for income generation, which can contribute significantly (if not cover) monthly payments. This creates a higher value for the customer; a system that fulfils more than basic lighting needs, and can help pay for itself.

Mobisol's value proposition is delivered through the business model components discussed in detail in the following sections, including products and pricing structure, sales, marketing, distribution, and on-going after-sales service.

Products and Pricing

Mobisol's different sized solar systems (30W, 100W and 200W) are sold in Rwanda at the prices shown in Figure 3. The focus of the grant was the 100W and 200W systems with the charging business kit, which includes the MobiCharger for multiple phone or laptop charging and 20 lanterns for rental (see photo). The standard components for the 100W system include three lights, a solar lantern, phone charging kit, 17" DC TV, solar radio and Mobisol T-shirt. The 200W system comes with the same components, but with a total of six lights. For an additional cost, customers can add up to 10 lights to the 100W system and up to 20 lights to the 200W system. Mobisol sells these systems as well as a smaller system without the business kit. The company's product design is done in-house and manufacturing takes place in China and Germany.

The prices below are standard, although Mobisol gave discounts to the first 100 customers (the majority of which were business kit customers as these sales were prioritised for the grant). Mobisol also gives discounts to all customers who complete payments early, within one or two years. In addition to the down payment and monthly prices below, Mobisol charges a non-refundable commitment fee[16] which helps cover the costs of credit scoring and stocking units.

16. Mobisol declined to share the amount of this fee.

FIGURE 3

Mobisol Products and Prices in Rwanda[17]

Panel Size/System Type	Down Payment	Monthly Payment
30W	USD 26.46	USD 9.66
100W	USD 37.66	USD 23.94
100W with business kit	USD 37.66	USD 31.92
200W	USD 81.06	USD 44.10
200W with business kit	USD 81.06	USD 53.20

Originally, Mobisol's Rwanda products included 80W and 120W systems, which could be purchased with the business kit. However these were replaced by the 100W system based on the average hours of sunlight in Rwanda and only needing one size to suit that range of usage (see section 3.2 for more details about business model refinements).

Mobisol communicates monthly pricing requirements to their customers, but allows them to pay in more or fewer instalments. Thus, each monthly payment above corresponds to the requirement for 30.5 days, regardless of level of use each day.

Source: Mobisol

Entrepreneur with his MobiCharger being used for phone charging; Mobisol 100W panel with battery and control box.

17. Prices in RWF converted to USD using an exchange rate of 0.0014 RWF / USD, the average exchange rate for December 2014 obtained from the OANDA Online Currency Converter.

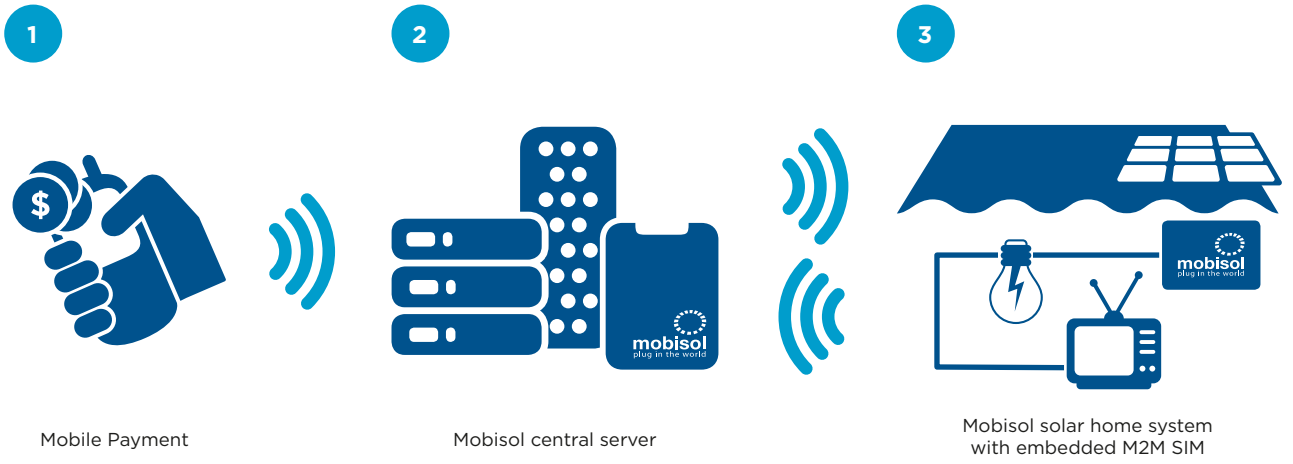
Use of Mobile: Technology and Partnership

Technology: At the core of Mobisol's pay-as-you-go service is machine-to-machine (M2M) connectivity and mobile money: a SIM card embedded in the solar home system enables two-way communication via the GSM network between the system and Mobisol's central server, which holds customer account and payment information. The process includes the following components, which are represented in the figure below:

1. Customers pay by dialling the MTN USSD short code for mobile money services and selecting a bill payment option. They enter Mobisol's bill pay number, their customer account number and the amount all via USSD.
2. The payment is sent to Mobisol's merchant account with MTN and through integration with Mobisol's central server, record of the payment is immediately updated in Mobisol's accounts. Mobisol's central server calculates the days of credit to be added to the account based on the payment amount. GPRS communication to the embedded M2M SIM card switches the unit on and off according to the balance.
3. Customers receive power for the number of days credited to the accounts and solar home systems. The embedded M2M SIM card sends information back to Mobisol's central server hourly about customers' powering habits and the solar system functionality to inform maintenance and future design.

FIGURE 4

Mobisol Pay-as-you-go Process



Partnership with Mobile Operator: Mobisol and MTN Rwanda both benefit in a "collaborative" partnership classified by a medium level of operator engagement to receive benefits with limited risk.[18] MTN Rwanda provides the technology and network (SIM cards programmed for M2M and application programming interface for mobile money integration), in exchange for anticipated benefits. Yet MTN does not carry the risks of providing the full energy service, which is outside of the operator's current core business. The anticipated benefits to MTN are as follows:

- Gaining and retaining subscribers attracted by the pay-as-you-go solar offering to increase market penetration.
- New revenue generation from fees on mobile money payments to Mobisol and increased phone usage due to direct access to charging.
- Increased subscriber use of mobile money, particularly in rural areas, for other transactions beyond airtime purchases and person-to-person payments, such as merchant payments.[19]

"MTN's mission is to make our customers lives a whole lot brighter, and the partnership with Mobisol is literally doing this. We initially partnered with Mobisol to enable customers to effortlessly buy prepaid solar power via MTN mobile money. MTN's digital connections and mobile payments help transform economies and societies, and we have seen an increase in mobile money penetration in the areas where Mobisol is delivering the solar solution thus reflecting a positive impact in our partnership."

- Former MTN Rwanda CEO Ebenezer Asante

Marketing, Sales, Distribution and Customer Service

Beyond product and pricing, Mobisol's success depends on careful attention to the key business components of marketing, sales, distribution and customer service. Figure 5 describes Mobisol's Rwanda operations for these business components. These were initially developed in Tanzania and have been adapted to the Rwandan market.

18. This classification reflects a spectrum of possible MNO engagement from lowest risk (cooperative) to medium risk (collaborative) to higher risk (co-creative). GSMA Mobile Enabled Community Services, Annual Report 2014.
19. "Over 85% of all Mobile Money Transactions in Emerging Markets are either person-to-person or airtime purchases." GSMA, 2014. State of the Industry; Mobile Financial Services For the Unbanked.

FIGURE 5

Description of Mobisol Operations for Core Business Components

Business Component	Structure & Strategies
Marketing	Above the Line: • Radio ad with song broadcast throughout Rwanda • Wall paintings on strategic building walls near service centres (see photo on pg 21) Below the Line: • Strong branding of sales & service centres & field staff • Agents market directly to target customers, going door-to-door • Demonstration of Mobisol product at Rwanda's mandatory monthly volunteer days, other village presentations • Customer-oriented celebrations of sales targets
Sales	Agents: • Mobisol Akademie trains, tests, and re-certifies sales agents & technicians (see box below) • Agents & technicians work as contractors and are commission based Purchase: • Following initial agent interaction, customers come to sales & service centre to complete a digitised credit score survey (see box below) • Customers are responsible for transport of unit from sales centre to their home Promotions: • Customer referral programme • Offered reduced down payment for entrepreneurial systems (during grant only) and all monthly prices lower than originally expected, as well as discounts on the total price of all systems if repaid within one or two years
Distribution	Three sales & service levels: • National: Kigali national sales & service centre • Regional: two regional sales & service centres in Bugesera and Rwamagana counties • Local: sales centres spread around the Eastern Province

Service	Installation: • Customer receives list of certified technicians in area & calls one to arrange installation at customer's convenience (no additional fee) Customer Communication: • Mobisol calls customers to ensure satisfactory usage and get feedback • Toll-free customer care hotline Monday - Saturday 7 AM-9 PM • Troubleshoot problems on the phone first, before sending out a technician • Mobisol calls customers when they detect a technical fault • Mobisol sends SMS payment reminder to customer; calls if payments are late Maintenance: • Free maintenance during three-year warranty[20] • Service guaranteed within 72 hours Customer demand: • Customers can upgrade to a larger system or add appliances throughout their lease

Mobisol Akademie – an Investment in Quality of Field Staff

Mobisol found there was limited existing training capacity in Rwanda and their other markets and they needed standardised and high quality sales and technical work. In response, they developed and improved specified training modules for agents, technicians and sales centre operators to ensure high quality field staff. Those wishing to become sales agents or technicians spend two weeks at the Akademie receiving content and practical training, and must pass exams to be hired (there is a 30-40% acceptance rate). Agents and technicians also get re-trained and certified every six months. The Mobisol Akademie also offers advanced level courses such as those that enable technicians to do maintenance in the field, and customer care training that helps call centre staff troubleshoot problems. This video provides more information: https://vimeo.com/103890197

Customer Credit Scoring

Mobisol uses a digitised credit-scoring process to select customers who have an income profile which suggests they can afford the monthly payments. This is particularly important for Mobisol to achieve repayment over the entire 36-month loan period. Customers must come into the market or regional sales centre to complete this credit approval process.

20. Mobisol's solar panels are backed by a 20-year warranty from their supplier.

Early Results

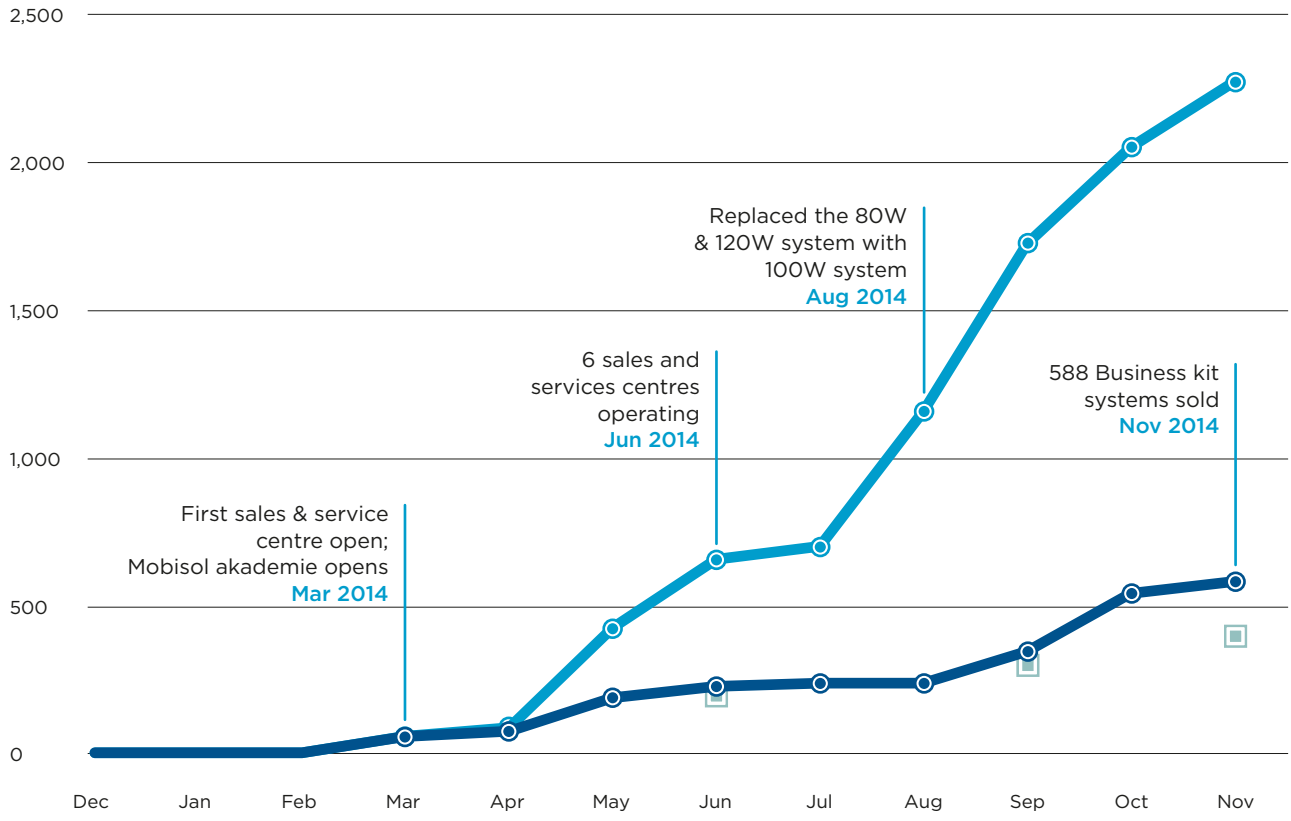
Business Model Viability

Sales

In 2014, Mobisol sold a total of 2,718 solar home systems in Rwanda, including 588 entrepreneurial systems. The monthly sales progression is indicated in Figure 6 below.

FIGURE 6

Mobisol Sales Progression and Key Project Developments



The above sales progressions include the following key findings about customer demand:

Of all products, the highest demand was for mid-sized systems. Approximately 80% of total sales were the original 80W and 120W systems, replaced later by the 100W system.

22% of all Mobisol customers opted to buy the business kit to generate income with their systems. This confirms Mobisol's expectations that 20-30% of customers would invest in a system that could generate revenue through a charging service. The number of Mobisol entrepreneurs who can operate viable businesses in each area is determined by nearby households' phone charging and lantern rental needs, so this may vary depending on alternative charging choices and penetration of other Mobisol systems.

From the appliances that come with the Mobisol system, entrepreneurs use lighting the most, followed by the MobiCharger, then TV and rental lanterns. The most desired appliances beyond those that come with the system were fridges, while customers also noted wanting inverters.

Initial willingness to pay for the entrepreneurial systems was lower than expected, slowing early sales. Mobisol based their initial projections on an estimated average Rwandan income of less than RWF 35,000 (USD 50)/month, which could be increased through purchase and operation of the business kit. Yet the value of potential earnings did not convince all interested customers, and many were still averse to the price. This reflects the challenge in estimating willingness to pay, particularly for an income generating system. Furthermore, during Mobisol's baseline and midline surveys, Mobisol found significant variation in reported customer income and expenditure on lighting and phone charging prior to the service.[21]

Repayment and Default Rates

Mobisol has seen a repayment rate of 99% for the entrepreneurial systems during the first year and 100% repayment by customers without the business kit.[22] Default includes several customers who returned their entrepreneurial systems, but the individual cases suggest it does not reflect inability to continue payments: some customers moved out of the service area, were connected to mini-grids, and one found that the market for a charging business was already saturated.

Mobisol entrepreneurs make an average of 1.7 payments per month for an average of 17.8 days of credit. One monthly instalment is for 30.5 days. 65% of customers make two or more payments to cover their monthly instalment. At this early stage of repayment, Mobisol has not seen any difference in repayment patterns between Mobisol entrepreneurs and non-entrepreneurial customers.

Refinements to Operations

Mobisol scaled operations quickly in Rwanda by promptly responding to challenges and refining their business operations. The key learnings and adaptations were around the product size and pricing, their strategy for supporting Mobisol entrepreneurs, and their customer service.

Products and Pricing

Launched 100W system to replace 80W and 120W: The cloudier weather in Rwanda made 80W systems less productive, and increasing to a 100W size would serve a similar demand as the 120W system, leaving only a need for a 100W system.

21. Data based on customer survey responses face challenges with accuracy. The methodology of these surveys and the limitations of the findings are described in the Appendix. In the baseline survey, 50 Mobisol entrepreneurs estimated their previous household lighting and phone charging expenditures as follows: The median monthly expenditure on lighting was RWF 4,000 (USD 5.60)/ per month, with a bi-modal distribution around RWF 2,000-5,000 (USD 2.80-7.00) and RWF 15,000 (USD 21.00). A single phone charge was estimated at RWF 100 (USD 0.14), where customers charged their phone an average of 2.4 times per week. Customers' recollections of past expenditures may have limited accuracy, so these figures should be taken as indicative.
22. Mobisol forgives up to 30 days of non-payment in a year after which customers are considered in default. The total repayment period is three years.

Added laptop charging to the MobiCharger: Rwanda's policy to provide laptops to school children,[23] compared with the 17% electrification rate, presented a new opportunity for Mobisol to include laptop charging ports in the MobiCharger.

Adjusted prices to stimulate early demand for the entrepreneurial systems: Customers did not initially recognise the potential benefits of the business kit and felt it was too expensive. Mobisol addressed this by re-structuring pricing to reduce the total cost and smooth the down payment out across monthly payments. As of 2015, Mobisol resumed normal down payment levels for the entrepreneurial systems as indicated in Figure 3.

Entrepreneur Support

Provided business manuals and customer contracts to Mobisol entrepreneurs: While 63% of Mobisol entrepreneurs had previously operated a charging business, many still required more information about operating the MobiCharger and improving basic accounting for their business (see Figure 7). Mobisol entrepreneurs also wanted assurance that their rental customers would be held responsible for damaged lanterns. In response, Mobisol provided contracts for entrepreneurs to sign with rental customers. Additionally, Mobisol provides entrepreneurs with banners and with loyalty cards to attract and retain charging customers.

FIGURE 7

Example Accounting Sheet in Business Manual

INSTRUCTIONS TO ENTREPRENEUR: WHENEVER YOU GET A CUSTOMER, DRAW A LINE IN THE 'CHARGERS' BOX TO KEEP TRACK OF THE NUMBER OF CLIENTS THROUGHOUT THE DAY

Month	**September 2012**					
Day	Revenues (Sh)			Expenses (Sh)	Profit (Sh)	Comments
	Charges	Price	Total	New Equipment, Monthly Payments, ...	Revenue - Expenses	
...	...	...	...	...	...	...
Tuesday 27th	///// ///// /////	250	3,750		**3.750**	Discount day
Wednesday 28th	///// ///// ///// //	300	5,100	- 16.500	**- 11.400**	Monthly payment for Recharging Station
Thursday 29th	///// ///// ///// ///	300	5,400	- 400	**4.400**	Bought 2 new Samsung pins
Friday 30th	///// ////	300	2,700		**2.700**	Cloudy weather, stopped charging phones in afternoon
Saturday 31st	///// ///// ///// /	300	4,800		**4.800**	
total	**450**	**132.000**		**- 52.500**	**79.500**	**good month!**

23. Under the One Laptop per Child Initiative: http://www.myict.gov.rw/ict/documentation/tracing-major-developments-in-rwandas-ict-sector/

Sales and Customer Service

Pre-sales to keep customers happy while waiting: Faced with a delay in the supply of MobiChargers, Mobisol continued to sell customers the entrepreneurial systems, but at a discounted rate for the months before the MobiCharger was available. This was a strategy to encourage positive word of mouth, rather than negative, and sell immediately to willing customers.

Re-training for agents and technicians: As Mobisol adjusted their pricing and operations, they identified the need to re-train agents and technicians to keep them up-to-date in their interactions with customers and continue to improve their sales over time. This is done through the Mobisol Akademie.

Customer Benefits

The quality of life and livelihood benefits to Mobisol customers using the business kit result from replacement of poor quality energy sources with cleaner, higher quality solar powered services, increased revenue opportunities from charging businesses and keeping existing shops open longer. Prior to Mobisol, most entrepreneurial households used a combination of energy sources for lighting: 30% used batteries with inverters, 30% used candles, 14% used kerosene and 8% used solar. Additionally, the majority travelled nearly three times per week to access these resources.[24]

Improved Energy Access

92% of Mobisol entrepreneurs surveyed use only Mobisol for their electricity needs. This means they have a reliable, clean source of electricity for their homes and/or shops, with a warranty and reduced transaction costs compared to recharging batteries (time and money spent travelling to town to recharge batteries on a diesel generator).

Business Earnings

Mobisol entrepreneurs can earn an estimated RWF 25,000 (USD 35)/month from their charging business (see box below). These earnings exceed the monthly payment for the 100W system and comprise 66% of the monthly payment for the 200W system.

80% of Mobisol entrepreneurs keep their business open 1.5 hours longer than before using the service. This means they are earning revenue both from charging, and potentially through extended sales of goods at their shops during dark hours. Some entrepreneurs also generate additional revenue through charging customers for TV viewing. For example, World Cup viewings in June 2014 were a popular source of income for Mobisol entrepreneurs.

24. Mobisol midline survey, see Appendix for methodology.

Challenges in Estimating Income

There is inherent uncertainty in estimating income generated via the Mobisol business kit. The estimate of RWF 25,000 (USD 35)/month is conservatively based on self-reported estimates of survey respondents summarised below. While customer statements about past activities are often inaccurate, Mobisol's information about actual devices charged (received via M2M connectivity) suggests the entrepreneurs may actually be charging more devices: Mobisol registers an average of 21 devices charged per day compared to the customer reported average of 9.92 phones and 2.86 lanterns. However, the number of devices detected by Mobisol may not accurately reflect revenue because it includes the power charges that may not have been paid for (e.g. for personal use). Furthermore, it cannot distinguish between lantern and phone charges.

Customer reported charging income:

Phones: RWF 18,300 (USD 25.62) /month, based on 6 days/week, average of 9.92 phones/day at RWF 77/ charge
Lanterns: RWF 6,580 (USD 9.21)/month, based on average of 2.86 lanterns/day at RWF 96 /charge

A further challenge is that income generation may vary between system size but the sample size was not large enough to allow for this disaggregation.

Children and Women

Mobisol entrepreneurs report that children use the lights to study from 6-9 PM (although previous hours of evening study time are not available).

The majority of registered Mobisol customers are men (95%) and while surveys indicate half of the Mobisol charging businesses are operated by men, about one-quarter are operated by both a man and a woman and 16% by a woman only.[25] This indicates the potential for Mobisol entrepreneurial systems to empower women with income earning opportunities.

Customer Experiences

The following stories of Mobisol customers paint a picture of these impacts on their quality of life and business opportunities.

"Before Mobisol, I had a 125W solar system which I bought in the city. But a battery was not included and so I had to buy an extra one. This former system did not even deliver enough energy to charge the battery fully to use all my devices and so I had to go to the city twice a week to charge the battery. Now with the Mobisol system, this is not a problem anymore. I have 10 lights, a TV and the Mobisol charger available 24 hours a day."

-From customer survey

25. The remainder are operated by employees or other family members.

Shop owners increase income: Alex Rusangiza and Josephine Mukamurenzi live in Bugesera and bought a 120W Mobisol unit to power their shop. Previously, he travelled 5 km to Nyamata every two or three days to recharge the battery he was using for a phone charging business. He was paying RWF 400 (USD 0.56) for transport and RWF 800 (USD 1.12) for the charging, and each year would have to replace the battery for RWF 75,000 (USD 105). In Nyamata, he heard about Mobisol and purchased the system with the business kit, including a MobiCharger and 20 lanterns. Now able to charge 10 phones or lanterns at a time, their charging business' net profit has increased from RWF 20,400 (USD 28.56) / month to RWF 36,900 (USD 36.90)/month, after their monthly payment of RWF 31,500 (USD 44.10). Additionally, they no longer pay for kerosene or transport and charging of the battery.[26]

Mobile Industry Benefits

One of the key objectives of the Mobile for Development Utilities Innovation Fund is to identify the types of mobile technologies that can support mobile enabled services. This depends in part on the benefits that accrue to mobile operators from partnering to provide these services. For MTN, the Mobisol project has brought several early benefits around expanding mobile money and growing revenue from this service.

Mobile Money

Mobisol sought to expand mobile money services, particularly following the baseline survey results that some people had registered for mobile money but did not use it because there was no agent nearby. Mobisol worked with MTN to increase mobile money agents in the area including at their sales and services centres where staff became mobile money agents.

New customers registered for MTN mobile money: Early data indicates Mobisol's offering can lead to increased adoption of mobile money services. 20% of Mobisol entrepreneurs surveyed had to register for MTN mobile money upon becoming Mobisol customers.

Mobisol customers are very active mobile money users: Mobisol customers can make their mobile money payments monthly, or more or less frequently. The entrepreneurs in this pilot make 1.7 Mobisol payments per month on average, which suggests most are significantly exceeding the industry benchmark of one mobile money transaction within 90 days. Data from MTN indicates that from January- April 2015, between 75-80% of Mobisol entrepreneurs were making a mobile money transaction of some type (including their Mobisol payment) at least once every 30 days. At the same time, they had not started making other bill pay or merchant pay transactions, suggesting that Mobisol is driving these customers' first use of bill pay services (see the box about Mobisol entrepreneurs' experience using MTN mobile money and opinions of MTN).

Increased purchase of airtime through mobile money: Data from MTN suggests that this group of Mobisol entrepreneurs increased the amount of airtime they purchased via mobile money by 74% between November and April 2015. The benefit to MTN is a reduced demand for printed airtime vouchers, which are resource intensive to distribute. However, MTN does not profit on these transactions, and this data alone does not necessarily show an increase in total airtime purchases.

Revenue from mobile money fees: All Mobisol customers in 2014 made a total of approximately 11,400 payments to MTN. Mobisol entrepreneurs made an average of 1.7 payments per month, with an average transaction fee of RWF 240 (USD 0.34).[27] Therefore, each Mobisol entrepreneur's transactions generate USD 0.58 per month to MTN. This is significant considering that MTN's overall ARPU is above USD 2. Furthermore, payment profiles suggest Mobisol customers start to make their payments in smaller, more frequent instalments over time, which will lead to greater revenue for MTN.

26. This reflects the monthly price of the 120W system, which has now been discontinued, and the cost for additional appliances.
27. Mobile Money tariffs are proportional to the size of the payment: http://www.mtn.co.rw/Content/Pages/115/Mobile_Money_Tariffs

Customers Able to Make Mobile Payments; Opinions of MTN Largely Positive

Over half of Mobisol entrepreneurs interviewed said they were able to make payments unassisted, while the remainder primarily get help from Mobisol staff. Nearly all customers trusted mobile money.

Of those who expressed an opinion about MTN, all but one expressed a positive opinion. Some noted that their perception of MTN had changed since using Mobisol:

"I decided to like mobile money" - Baziruwiha, Jean Pierre

"...we discovered how important MTN is" - Nkurunziza, Francois Xavier

"...before I did not use MTN mobile money, now I use it" - Nsanzimfura, Cassien

Additional Mobile Operator Benefits

Potential increase in airtime usage and average revenue per user: It is possible that when new Mobisol customers gain convenient access to reliable electricity, their phones use will not be restricted by lack of power for charging, therefore giving them the opportunity to use more mobile services. However, insufficient data was generated on this to quantify any benefit.

Revenue from M2M SIM data usage: MTN provides Mobisol with an initial amount of free data for their M2M SIMs, but Mobisol pays MTN for the cost of the SIM cards and additional data.

Increased long-term customer loyalty through continued use of mobile money: Mobisol customers commit to 36 months of payments using MTN mobile money. This commitment to using MTN's service keeps customers using their MTN SIM card at least for Mobisol payments, but likely for other services as well, and MTN can reach them to market new services or offers.

Wall painting in Tanzania

Conclusions

One of the key objectives of the Market Validation Grants is to better understand the building blocks to scale mobile-enabled businesses. Mobisol's project provided particularly important insights into this as they sought to replicate a "blueprint" from their operations in Tanzania and then build a Rwanda specific operations manual. They have demonstrated that their business model has strong potential for replication, though key aspects require more in-depth understanding in each market and more hands-on management. In particular, Mobisol made important adaptations to their products and pricing, entrepreneur support, and sales in order to spark early demand where initial willingness to pay was somewhat lower than expected.

A key learning beyond the scope of this grant will be the level of continued demand for Mobisol's entrepreneurial offering without pricing incentives. Furthermore, complete repayment by entrepreneurs and other Mobisol customers will be demonstrated at the end of the 36-month loan period.

Nonetheless, Mobisol's first year of operations in Rwanda, in part financed by this grant, catalysed continued funding from the EU and further private and public investment to expand by almost 16-fold by 2018. Furthermore, the partnership with the Rwanda Energy Development Corporation Limited, is one of the first of its kind between a national utility and off-grid solar provider. These outcomes highlight the key impact that this innovation fund seeks to achieve.

Appendix: Case Study Methodology

Overview: This case study is based on learnings that emerged throughout Mobisol's Market Validation grant through the Mobile for Development Utilities programme. These were tracked through the following:

Grantee reporting: Monthly reports were completed on activities, project risks and mitigation, and key performance indicators. These were discussed during a one-hour call with the grant manager each month. Quarterly reports were completed to document progress on milestones, the grantee's learning objectives, barriers and other key project developments as well as financial compliance.

Customer Surveys: Mobisol carried out a baseline survey and a midline survey as part of this project. The baseline survey was carried out in Bugesera, the first targeted district, including three different settlements around the small town of Nyamata (Mobisol's Regional Hub). The survey was conducted on January 15-16, 2014, prior to Mobisol starting sales or having a known presence in the area and the interviews of the 24 participants were carried out in person.

The midline survey was specifically targeted at Mobisol entrepreneurs (i.e. those using the business kit with both the original 80W, 120W and 200W systems and ultimately those with the 100W and 200W systems) across Bugesera. The survey was conducted from August 19-25, 2014 and included a 50-person sample out of a total of around 239 customers by the end of the month. The majority of interviews were carried out by phone, some in-person.

Data from MTN Rwanda: Data was obtained from MTN Rwanda on monthly aggregated use of mobile money by the Mobisol entrepreneurs in this pilot.

Limitations of this study: The study aims to provide only the key learnings from Mobisol's grant and cannot possibly cover all the day-to-day learnings from Mobisol. It also aims to share learnings with the broader sector without releasing commercially sensitive data from Mobisol or MTN Rwanda.

The customer surveys are meant to be representative while not necessarily statistically significant to a specified degree of certainty. Customer surveys are known to have limitations in accuracy, particularly around expenditures, income and previously carried out activities, where people often fail to recall these correctly or are influenced by perverse incentives (e.g. stating a lower income than reality thinking it will reduce the future pricing).

For more information on the Mobile for Development Utilities programme visit: www.gsma.com/mobilefordevelopment/

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