

M-PESA: Mobile Money for the “Unbanked” Turning Cellphones into 24-Hour Tellers in Kenya

In March 2007, Kenya’s largest mobile network operator, Safaricom (part of the Vodafone Group) launched M-PESA, an innovative payment service for the unbanked. “Pesa” is the Swahili word for cash; the “M” is for mobile. Within the first month Safaricom had registered over 20,000 M-PESA customers, well ahead of the targeted business plan. This rapid take-up is a clear sign that M-PESA fills a gap in the market. The product concept is very simple: an M-PESA customer can use his or her mobile phone to move money quickly, securely, and across great distances, directly to another mobile phone user. The customer does not need to have a bank account, but registers with Safaricom for an M-PESA account. Customers turn cash into e-money at Safaricom dealers, and then follow simple instructions on their phones to make payments through their M-PESA accounts; the system provides money transfers as banks do in the developed world. The account is very secure, PIN-protected, and supported with a 24/7 service provided by Safaricom and Vodafone Group.

The project faced formidable financial, social, cultural, political, technological, and regulatory hurdles. A public-sector challenge grant helped subsidize the investment risk. To implement, Vodafone had to marry the incredibly divergent cultures of global telecommunications companies, banks, and microfinance institutions—and cope with their massive and often contradictory regulatory requirements. Finally, the project had to quickly train, support, and accommodate the needs of

Two authors have written this case study, each taking up one part of the story. The first section is written by Nick Hughes, a Vodafone executive who started this project in 2003 and now heads a mobile payments team with the task of growing the business globally. Nick led the efforts to get Vodafone focused and supportive at the very senior levels of the company in what seemed at the outset to be a fringe project.

The second section is written by Susie Lonie, an m-commerce expert who was brought into Kenya to work through the detailed design phase and project manage the overall delivery of the service from pilot into commercial operation. Susie describes the day-to-day obstacles that needed managing, many of which could never have been foreseen at the outset.



Figure 1. M-PESA screenshot.

Source: Image courtesy of FDCE; *photographer*: Tom Lee.

customers who were unbanked, unconnected, often semi-literate, and who faced routine challenges to their physical and financial security. We had no roadmap, but created solutions as we went and persevered when a pilot slated to take several months took almost two years.

Why and how does a telecom company like Vodafone start a banking project like this? It's not part of Vodafone's core business; it was not developed in a core market (Kenya is a relatively small market in Vodafone's terms); and it has little to do with the voice or data products that drive Vodafone's revenue streams. Telecom companies are young and fast moving; banks are old, traditional, conservative, and slow moving. And, having generated the concept and decided at the corporate level to implement it, what are the practical issues that need managing to get the project off the ground and into commercial operation? These are the questions we seek to answer here.

STAGE 1. MILLENNIUM DEVELOPMENT GOALS, VODAFONE, AND
PUTTING THE DEAL TOGETHER
AUTHOR: NICK HUGHES

The backdrop to our case study lies in the development debate. As part of the Millennium Development Goals,¹ many of the world's leading nations have com-

mitted to reduce poverty by 50% by 2015.

Traditionally the realm of state organizations, donor agencies and nongovernmental organizations, development is today understood to be unachievable without the engagement of the private sector. There are now more than 2 billion mobile phone users world-wide and for the vast majority of people the first phone call they ever make will now be on a mobile device. When I joined Vodafone in 2001, I welcomed the opportunity to work in a sector that is witnessing one of the fastest adoptions of a new technology the world has ever seen. Vodafone is a relatively young, technology-based service organization that is keen to proactively manage its impact on society. Part of my initial job in Vodafone was to help it understand its role in addressing issues like the Millennium Development Goals.

In my role at Vodafone, I had become aware of a promising approach to tackling sustainable development, one in which I was sure Vodafone could significantly and legitimately play a role. This approach is simple: access to finance facilitates entrepreneurial activity. In turn this creates wealth through economic activity, job creation, and trade. There has been much positive discussion in recent years about donor agencies seeking new ways to deliver funds to those who need it most, directly and in a more efficient manner, so that the capital is productively deployed. Witness the number of large, private sector-derived Foundations and Trusts that are addressing poverty alleviation through enterprise, bringing the rigors of an investment-style approach to the debate. These range from the Gates and the Soros Foundations to new social investment funds. At the core of these initiatives is a willingness to find more effective ways of delivering assistance—a hand up, not a hand out.

Getting cash into the hands of people who can use it is limited on the supply-side rather than demand-side; there is no shortage of funds, but it's the ability to move money from the sender to the receiver that is the stumbling block. Since the creation of money, the ability to move it from A to B—the so-called “velocity of money”—has been a fundamental cornerstone of economic activity. But the issue is exactly how money transfer is made to happen in an emerging market where the infrastructure is poorly developed and where very few people have or even want bank accounts. Under such circumstances, moving cash is risky, expensive, and slow. Enter telecom network operators, who can adapt mobile technology to deliver financial services in a fast, secure and low cost way, especially in developing parts

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of the world where microfinance institutions have begun to spread and begun to build an infrastructure.

Getting Funding

I started my M-PESA journey at the World Summit for Sustainable Development in 2003. After spending an afternoon contributing to a debate about how private sector organizations are driven by short term goals and thus don't typically address long-term sustainable development, I was approached by a representative of the U.K. government who controlled a challenge fund project set up by the Department for International Development (DFID). Our discussion centered on the following: Private sector organizations such as Vodafone are legally bound to use their shareholders capital to achieve the best returns. But many organizations use internal competition to allocate funds to their projects, and this competition is based on potential returns on investment. As a result, any initiatives that relate to the development agenda usually get squeezed out. Without wishing to overgeneralize, often the only place within an organization where the development agenda can ascend is in departments that are more concerned with stakeholder engagement, government relations, policy debate and corporate reputation. How could firms raise executive-level interest and get funding to develop products that will be non core and long term but do have some sort of sustainable development theme?

One angle could be to position such projects in the Research & Development (R&D) department. This would work in many sectors where new products take a long time to reach market, but many technology-based companies—and Vodafone is no exception—tend to keep R&D focused on the technology rather than the marketplace. Financial services in emerging markets are not about new technology; in fact, even at the early concept stage we expected to use a very basic application of mobile communication, called SMS (or text messaging), certainly not the sexiest aspect of mobile technology, especially in the core European markets where java applications, 3G and smart phones were all in vogue. This wasn't about new technology, it was about a new application of existing technology.

Enter the role of challenge funds. What if a firm could use somebody else's capital to overcome the internal competition (one hurdle down) and a compelling proposition could be shaped that would give the company some comfort that the project was addressing a market of potential future value?

And so it was in a conference hall in Johannesburg that I first gave serious consideration to using a challenge fund to circumvent the constraints of our new product development processes. I must make it clear, these corporate processes are there for a very good reason—the management framework brings discipline to project development and helps ensure that funds are spent wisely for the shareholders. But equally it is also important to find ways to initiate new areas of business that are higher risk; in this regard I believe that challenge funds have a strong role to play.

A Public–Private Partnership Opportunity

In 2000, the U.K. government's DFID established the Financial Deepening Challenge Fund (FDCF), making available £15m for joint investments with the private sector on projects that help improve access to financial services. Twenty-eight projects have been funded in South Asia and Africa. The money was awarded on a matched basis (50% of total costs) and a competitive bid process. Vodafone's contribution could be in the form of people, budgeted at an agreed rate. The FDCF fund managers and the proposal assessment team were looking for innovation. This could involve the development of a product or service that was not previously available in a target market, a new service that gave customers access to goods or services that would previously have not been available, or the application of a technology that reduced the costs of service provision. Many of the successful applicants were large, well-known private sector companies that faced challenges similar to Vodafone's in pursuing what would be perceived as low yield projects.²

I spent a few weeks in mid-2003 putting together a proposal, whilst focusing on two things: broad support for the concept from a couple of very senior executives in the company, and the buy-in of my colleagues on the ground in East Africa (FDCF's target zone). Both were fundamental to progress. If somebody at the top of the company doesn't provide executive sponsorship, things won't happen and the project would eventually be relegated to the scrap-heap of PowerPoint presentations. And at a practical level, it quickly became clear that we faced a resource issue on the ground. Safaricom is a very successful company, growing very quickly, and its employees are all extremely busy growing the mobile customer base, operating the network, and supporting customers with voice and text products. Expecting the Safaricom team to engage in a complex project alongside their day jobs would be a mistake. Instead, I decided to provide a dedicated project manager who could lead all aspects of the development, integrating with the relevant departments of Safaricom from IT, Operations, Customer Care and the senior management team.

When I submitted the proposal, there were many unknowns. Much of the proposal was weighted towards completing a preliminary *needs assessment* and not a functional specification of a new product. The entrant of a telecom company into a funding competition for the financial services sector took a few of the FDCF proposal review team by surprise, but we overcame some initial cynicism and were awarded funding of nearly £1 million, which was matched by Vodafone.

A few weeks later, contracts were signed and we set about organizing a series of open workshops in Nairobi and Dar es Salaam. Invitees included banks, micro-finance organizations, other technology services suppliers, nongovernmental organizations with an interest in micro-credit, and representatives from the telecoms and finance sector regulators. We asked a question: Assume that the technology can do anything you want it to; what are the biggest challenges you face in growing your business or increasing access to financial services? We were able to

identify two broad findings: (1) improved internal management processes would allow organizations to speed up and improve the efficiency of delivery; and (2) it should be very simple for customers to get access to finance.

The natural inclination of a service organization is to think about the consumer first so we focused on number two. A pilot partnership was created between us (the network operators), a micro-finance institute (MFI), and a commercial

bank. The view was that each could bring to the project a different set of competencies, which would improve access to finance for the un-banked population. Network operators bring connectivity and a huge reach through the airtime reseller distribution network; a microfinance organization understands the market need for micro-loans and other financial services but is typically not a regulated bank; and a commercial bank brings the discipline and compliance aspects of storing and managing customers' funds.

The proposition started to firm up around the design and test of a platform that would

allow a customer to receive and re-pay a small loan using his or her handset. We wanted to allow the customer to make payments as conveniently and simply as they do when they buy an airtime top-up, so a central feature of our proposition was to use the distribution network of Safaricom airtime resellers (or Agents in M-PESA terms) to facilitate this process. This service should also bring business efficiencies for the MFI and allow it to grow its business more quickly and to more remote locations than is possible using traditional paper processes.

STAGE 2. FROM TWO MONTHS TO TWO YEARS AND
LEARNING TO PUT CUSTOMERS AHEAD OF PROCESS

AUTHOR: SUSIE LONIE

Turning a Concept into a Pilot

Sitting in a comfortable office in England and deciding what Africa needs is an approach doomed to failure. The market is littered with first-world solutions that have utterly failed in emerging economies. For this project to be successful

Vodafone needed someone on the ground in Kenya, ensuring that the team properly understood the environment in which the service needed to work, and the detailed product requirements. That's where I came in. Because of my background in Western-style mobile commerce, I was invited to accept a short secondment to Kenya to complete a product specification and get things moving. In February 2005 I boarded a flight to Nairobi.

We had a fair idea of what we wanted the service to do, but were not sure how to do it. The first big decision was buy or build? If we could buy software off the shelf to meet our needs it would make sense to buy. So we went shopping and found a multitude of financial service platforms with a fairly similar range of functionality. Therein lay the problem: They had all been designed with Western banking infrastructure as the point of reference, and then added on other features. It became clear that we would have to make some significant compromises around the functionality and user experience if we bought one of the proprietary products. We reluctantly decided that we would have to bite the bullet and build our own service from scratch.

This decision raises a key point which has reappeared regularly in every aspect of this project. There is a fundamental difference between the way banks and telecoms operate. Mobile network operators are relatively young, entrepreneurial companies that have experienced rapid growth and high profits through huge volumes of low-value transactions. Banks tend to be mature organizations with well-established business practices and a reassuringly cautious attitude to change. Their business is based upon fewer transactions that generate relatively high margins. The net result is that when a telecom decides to create a financial service such as M-PESA, there is a collision of philosophies. So we decided to build.

And Now for Something Completely Different

The difficulty with doing something totally new is that you are not terribly sure where you are going until you arrive. We knew a few things, but much of the time we were guessing. This made the formal request for proposal (or RFP) something of a working document, but there were some key principles to follow:

It was critical to understand the systems and capabilities of Safaricom, the local mobile network operator that provides connectivity. Safaricom would also administer the pilot on the ground, so gaining its commitment was a critical first step. An understanding of Safaricom's systems and capabilities had to underpin whatever we developed, so that we could give it appropriate tools to run the commercial service.

We were specifically targeting the unbanked. So whatever we designed would need to operate in the absence of a consumer bank account. Therefore we needed to hold whatever real money was in the system in a bank somewhere on the customers' behalf.

The e-money must always exactly match the real money or we could find ourselves in the unfortunate situation of creating currency. We partnered with CBA

(Commercial Bank of Africa) in Kenya to provide whatever conventional banking services were required. The platform issues e-money to mirror real money in that bank account.

The consumer interface would have to be a basic model mobile phone. One challenge was that smartphones are not abundant in Kenya. Thus, communications channel options were limited to modes such as Voice and SMS (text messaging). It took little time to determine that SMS was likely to offer the best compromise between usability, security, and cost. Menu-driven access by SIM toolkit, which is standard software on all SIM cards, was the obvious way to go.

We had to find customers with a real market need to use the service. This may appear obvious, but the mobile commerce market is strewn with technical solutions looking for a problem. We partnered with Faulu Kenya, a local MFI (micro-finance institution) with several thousand borrowers, who typically run small businesses. Most of Faulu's customers repay a few dollars every week into the Faulu bank account. The normal process for doing this is to form groups of about 20 people who meet each week and submit cash to the group treasurer. He in turn takes the money to a local bank, accompanied by a suitable bodyguard of group members. This may involve a long bus journey to the nearest bank. The weekly loan repayment ritual is time-consuming, costly, and keeps people away from their businesses. Here, we agreed, was a real market need where mobile commerce could make a significant difference to people's lives.

We needed retail outlets to act as M-PESA agents, where consumers could go to deposit cash into or withdraw cash from their e-money accounts. Safaricom has a large, established network of several hundred airtime dealer outlets across the country where consumers buy prepaid airtime credit. Dealers are independent companies with typically 5 to 20 retail outlets selling airtime, cellphones, and other goods. So these dealers seemed to be an obvious initial source of agents if we could figure out how to engage them. It was clear to us even then that we would need other types of retail outlets in order to provide reach into rural communities, but these dealers were a start.

We spent some time deliberating over whether agents should be given POS (Point of Sale) devices and the customers given magnetic stripe cards. However, visits to physical retail outlets (and thinking about scaling up a successful pilot to a national launch) provided a severe dose of pragmatism. POS devices cost a lot of money and need to be maintained. Perhaps some retailers in the city could afford them, and perhaps we could convince them that the business opportunity justified the investment, but there was not a hope that the poorer and more remote areas could afford to participate. Instead, we opted for the rather elegant solution of giving the agent a mobile phone with a different M-PESA menu than consumers, customized to their needs. The low-end phones we used cost about \$40 each and required no maintenance at all.

The RFP took account of all these points and many more; we tendered for an external software developer; and chose Sagentia, a British company specializing in "blue sky" strategic development. As we suspected, the RFP was far from exhaus-

SNAPSHOT: Mobile Money Speeds Commerce

Mary Mwangi has a small general store in Meru, Kenya. She has just received a call from a family friend and occasional supplier of stock to her shop who lives in Nyeri, nearly 100 miles away. She is told that for Ksh 7,000 (about \$100 US) she could secure a supply of kitchenware for less than half the usual price, as long as she can pay for it today. This is a good opportunity for Mary as she knows that she can sell these goods in Meru at a profit.

How does Mary secure this deal quickly? Time and distance are not on her side. She doesn't hold a bank account and neither does the supplier. She does have the cash but it is in her Meru store. She could send her money with a friend on a bus to Nyeri but it will take most of the day and cost a significant part of her profit. Traveling with money is also a risk as highway robbery is not uncommon.

The answer lies in M-PESA (*pesa* is the Swahili word for cash). Mary recently registered with Safaricom to open an M-PESA account. This was a simple process that gave her access to an e-money account managed entirely through some simple menu instructions on her prepaid cellphone. Ten minutes after the call from her friend, Mary has been to a local Safaricom Airtime Dealer (of which there are several in Meru) and has deposited Ksh7,000 into her M-PESA account. This is very similar to topping up her prepaid cellphone airtime, except she is loading cash into her M-PESA virtual account. A few minutes later Mary has returned to her shop where she sends an SMS text message instructing M-PESA to transfer half the cost of the goods to her friend's M-PESA account, effectively securing the purchase with a real time funds transfer. The goods are dispatched to Meru on the next bus, and when they arrive Mary settles the remaining money by sending another text message instruction to the M-PESA service.

Making this payment quickly and securely by cellphone cost Mary Ksh60 (less than a dollar).

The M-PESA service is fast, secure, and very cost-effective. It is opening up new opportunities for businesses like Mary's all over Kenya as well as supporting person-to-person money transfers, or remittances, which are common in many economies where the bread winner supports an extended family, often many miles away.

ative; it was important that Sagentia be extremely open-minded and flexible, create a very configurable system, and show a strong willingness to get involved in defining the detailed functionality. In fact, Sagentia demonstrated the required skill set and attitude many times during this project.

Where Angels Fear to Tread

The list of tasks to get the pilot working was prodigious. Our total human resources amounted to Nick in the U.K. with me on the ground in Kenya sorting out the practicalities full-time; as much of Sagentia's time as we could afford; and any help we could coax out of whomever came our way, especially from a number of Safaricom employees. We were fortunate that the project inherently appealed to people. It is unusual in a large, competitive commercial business to work on a project that is truly ground-breaking but small enough that each individual can make a big difference, and to address a need which could materially change the lives of many people for the better. So help was forthcoming, but at a cost: Each member of the core team put in effort significantly beyond the call of their contracts.

The first thing we had to sort out was where to locate the servers. Our initial assumption that they would need to be housed in the local bank hosting centre was incorrect. The pilot service was principally supporting microfinance transactions, which is currently unregulated in Kenya. We were advised that if a bank hosted the service it would lead to unnecessary complications and delay. We arranged for the servers to be placed at Safaricom instead. They eventually arrived after an extended delay due to incorrectly copied paperwork in the Middle East and various customs issues. Once installed, the U.K.-based technical team gamely battled to work with them. Internet speeds in Africa are often not quite as fast as in the West, and after several weeks of waiting over a minute between clicks from one transaction to another it was clear that we needed to rethink matters before the techies rebelled. So the main servers were relocated to the U.K. and connected to Kenya by an internet protocol (IP) link. The developers then happily got on with tapping in code.

The service needed a name. A local advertising agency quickly suggested M-PESA. You may recall that *pesa* means money; dial M for mobile, and a short, simple, catchy brand name is born.

We needed a source of Faulu clients who could participate in a trial of M-PESA. As this was a pilot and we expected that there would be various issues, it made sense to start with groups in Nairobi who were accessible. Two locations were identified: the City Centre and Mathari, a slum about a 20 minute drive from the centre of town. The pleasant market town of Thika, about an hour up country, was confirmed as the third location for the pilot. Faulu then recommended a few groups most likely to understand how to use a cellphone and embrace the service so we could get off to a flying start. Other (less mobile-phone literate) groups were deferred for later.

Meanwhile we needed to finalize the consumer handset experience based initially on English text. Whilst many Kenyans speak pretty good English, the further from Nairobi you go, the more Swahili and tribal languages take over. As one of the key requirements of our funding was to extend financial services to rural areas, we decided early that we needed to be dual language.³ All the phone menus and SMS responses needed to be translated. One a challenge was getting the Swahili mes-

sages down to no more than 160 characters. By contrast, English is a very compact language.

It was unexpectedly straightforward recruiting agents where customers could load cash in or take cash out for the pilot. One sales team identified the most appropriate existing airtime dealer stores in the areas where the pilot customer groups met, and we paid the head offices a few visits to explain the service and the potential benefits for their businesses and for Kenyans generally, and they quickly agreed to become M-PESA agents. The underlying cause of their ready support was the remarkable success of mobile phones in Kenya; five years earlier Safaricom had a few thousand subscribers, and by the pilot that number had risen to 5 million. The dealer businesses had been built upon mobile operator innovations, so for them this was simply the next innovation.

One small hitch was the absence of potential agents in Mathari. But such is the entrepreneurial nature of Kenyan business people that one of the agents saw this as an interesting gap in the market. She paid a visit to the area, fell into conversation with a local petrol station owner, and a few weeks later had built a small shop on his forecourt that became a thriving business in Safaricom airtime, as well as supporting the M-PESA pilot.

Within Safaricom, there were two key groups of people involved in the pilot. The first was Customer Service, to take calls from consumers or agents with issues. A dedicated M-PESA line, 234, was created for their use. The second was Finance, to manage the flow of cash to and from the M-PESA bank account and accurately reflect it in the M-PESA system.

Internal training sessions were organized to show how to use the handsets and screens, and to underscore the basic principles by which the service worked. Operating instructions, frequently asked questions, and escalation procedures (an incremental process for managing problems) were created. Ongoing coaching on this new type of business was used to ensure everyone knew what they were doing. In addition, occasional resources were needed from Engineering, Billing, Risk, Operations, Sales, IT, Marketing, Products & Services, and just about every other department. Beyond a general instruction to the business from on high to be cooperative, staff had absolutely no direction in their job descriptions to give the level of help that they did. It says much for the nature of both the people and the project that they rallied to the cause and were incredibly supportive.

Coming to grips with Faulu's back-office requirements was more difficult. Faulu uses a paper-based system that involves collecting hand-written records from the field every week, and having a room full of people input the data in its central microbanker system. Faulu had difficulties in managing the manual procedure and the M-PESA pilot simultaneously and so decided that their best route forward was to eschew the benefits of an automatic real time data entry system and replicate each of their manual processes electronically. This included replicating the group payment structure by cellphone and having the same data input clerks print out and manually input all the electronic M-PESA records.

As the time approached to begin the pilot, Faulu became understandably cau-

tious about the robustness of the system and the security of its money. We had to run a familiarization trial with Faulu's internal staff for several weeks to give them greater confidence in and familiarity with the system. It slowed us down but allowed us to practice our training techniques.

Lift-off

On 11 October, 2005, the pilot finally started. Eight agent stores were given their M-PESA phones and repeated training sessions. Nearly 500 clients were enrolled, given phones, and instructed to use M-PESA to repay their loans. Their incentive was a free phone and a few dollars in their M-PESA accounts.

The first obstacle we encountered was the agents' hesitation to pay out cash withdrawals. No matter what the training told them, it was a brave shop assistant who opened the employer's till and handed out cash because they had been sent a text message telling them to do so. We overcame this problem by giving agents separate M-PESA cash floats, along with reassurances from their head offices. I also visited agents every day to help with the cash withdrawals until they got used to it.

Consumer training was quickly identified as being probably the biggest challenge. The challenges included:

Familiarity with phones: There was a great divide between people who were familiar with mobile phones, and people who were not. The former tended to pick up M-PESA quickly. For the latter group, the first chunk of any training session was taken up by explaining the concept of a menu, showing them how to find M-PESA, how to find their SMS inbox, etc.

Training environment: It's no surprise that training smaller groups in comfortable surroundings definitely work best. I remember one nightmare session in a tin shed with the mid-day sun beating down, an enthusiastic 40-a-side soccer match going on outside, and about as many potential clients wrestling for hours to learn how to use M-PESA. It says much for their persistence that they learned the system.

Task complexity: The pilot involved quite a number of consumer transactions. Because of the need to follow Faulu's paper processes for loan repayment, clients paid a treasurer group account; once the treasurer had all the SMS payment records, he paid Faulu by SMS. In addition, clients could send money person-to-person (P2P), deposit cash in or take cash out with an agent, and also needed to contend with account administration, such as changing PINs. Cramming all of this into one session was a tall order.

It was clear that we would need to find a way to simplify things before launching a national service for millions of customers.

A month or two into the pilot we decided that we could expand the volume of business by allowing consumers to buy prepaid airtime with their M-PESA e-money. Thus we created a new menu item and connected to the Safaricom billing system. More consumer training ensued, but as a hook we offered an introductory 5% discount on any airtime bought by M-PESA for a few weeks. The results

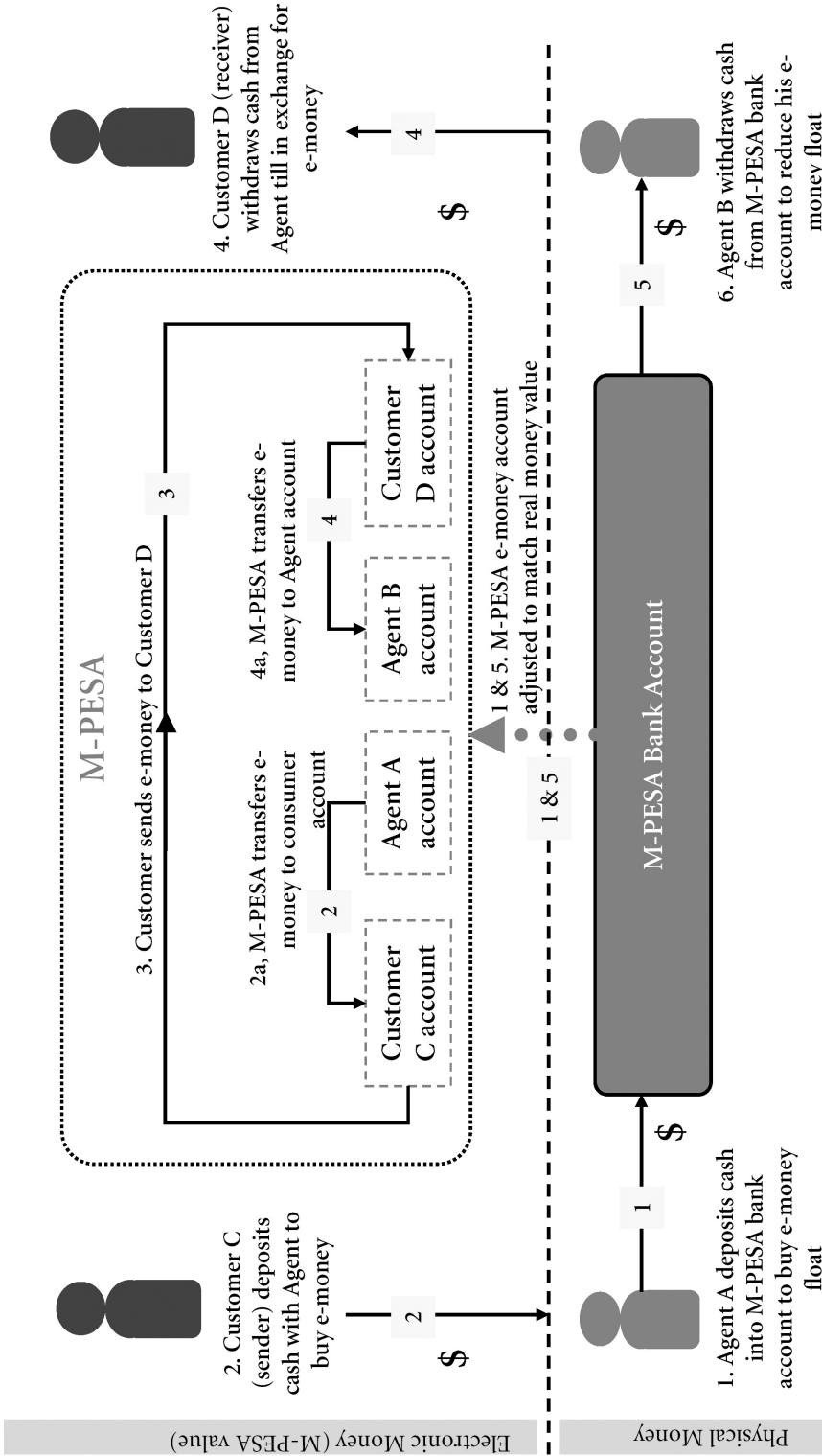


Figure 2. Overview of the M-PESA service.

were gratifying. We even saw a number of customers setting up as informal airtime resellers as a side business.

There were several instances of this kind of entrepreneurial behavior. We watched the transaction patterns closely on the web screens and speculated upon what was going on. When we could stand no more we organized researchers to explain some of the transaction patterns. Aside from the standard loan repayments for which we had designed the system, we observed several other applications:

- People repaying the loans of others in return for services;
- Payment for trading between businesses;
- Some of the larger businesses using M-PESA as an overnight safe because the banks closed before the agent shops;
- People journeying between the pilot areas, depositing cash at one end, and withdrawing it a few hours later at the other;
- People sending airtime purchased by M-PESA directly to their relations up country as a kind of informal remittance;
- People outside the pilot population being sent money for various ad hoc reasons; for example, one lady's husband had been robbed, so she sent him M-PESA to pay for his bus fare home;
- People repaying loans in return for cash on behalf of a few colleagues who hadn't mastered the use of the phone—or simply sold it.

Initially we had problems with clients losing their SIM cards—not the phones, just the SIM cards.⁴ How could this be? We learned that perhaps half of our clients already had phones and rather than carry both phones around, they tended to carry the M-PESA SIM in their wallet and swap the SIMs when they wanted to do a transaction. SIM cards are small, easy to drop, and easy to lose when not wrapped in a phone. It also became apparent that if M-PESA was not readily available on the SIM, the number of spontaneous transactions was going to suffer. After issuing our first dozen replacements it became clear that we needed to fix this and thought of SIMEX cards. SIMEX are SIM cards without associated phone numbers—if you lose your phone but want to keep your number when you get a replacement, the SIM used is a SIMEX with your old number transferred to it. So we ordered some M-PESA SIMEX, transferred the customer numbers to them and moved their M-PESA accounts to their own phone numbers. The number of lost SIMs dropped to negligible levels, and the number of transactions increased. It seems obvious now, but it was a big step forward for the success of the pilot.

It was clear that the vast majority of group members strongly appreciated the convenience and security benefits from using M-PESA for loan repayments. This was not entirely good news for Faulu; clients no longer had the same compelling need to attend the weekly group meetings. Opinion is divided upon the value of MFI group meetings generally; Faulu was strongly in the supporters' camp and consequently found the drop off in attendance disturbing.

Over the duration of the pilot it became apparent that the service was more user-friendly for the clients than for the microfinance institution. Kenya Faulu had

ongoing difficulties with its internet connection, even after we provided a dedicated mast and satellite link. Reconciliation of the M-PESA and conventional accounts was a headache, and loan disbursement required significant over-riding of Faulu's existing automated processes. The bottleneck in transferring the money M-PESA had collected in loan repayments to Faulu's bank account was getting its books to a point where it could request the funds.

To make M-PESA more suitable for institutions like MFIs, we need to create data export files that can be easily uploaded in whatever format their existing software requires. Ideally, we should create an interface directly between their systems and M-PESA. This is not a difficult task—M-PESA keeps detailed records of everything; we just need to know what data is required and in what format.

Meanwhile, the benefits to consumers of using M-PESA to help manage their personal finances were obvious and compelling.

Turning a Pilot into a Launch

By the end of the pilot, executives at both Safaricom and Vodafone realized we might be onto something big, despite M-PESA's unusual origins. For Safaricom, the big opportunity was to extend its service into a completely new kind of business as a Payment Service Provider with a new revenue stream, and to use this to increase customer retention. M-PESA charges a transaction fee to the sender of funds. These charges vary by the type of transaction and the amount of funds being moved. The service itself is free and all deposits made into the M-PESA account are free. There is no impact on the customers' airtime credit for any M-PESA transactions. (Current tariffs can be viewed on <www.safaricom.co.ke>.)

For Vodafone, it became clear that the M-PESA system formed the basis of a low-cost International Remittance Service. Globally, international remittances are a \$300 billion business, fuelled by migrant workers sending money home. Many of the busiest remittance trails, such as Germany to Turkey and Europe to India, are in territories where Vodafone has a presence. So getting approval to launch in Kenya was pretty straightforward. Doing it was, of course, another matter.

The pilot officially ended on 1 May, 2006. In practice it ran on until October since nobody really wanted to stop using it, but the data collected through May gave us the information we needed to make decisions. We had evidence that the product functionality was right, both technically and commercially, to provide a service that could deliver a healthy profit and meet consumer needs, both in Kenya and other developing economies. The next step was to get agreement from Safaricom to support a Kenyan launch, which meant preparing a detailed launch product definition. The pilot experience had shown that a mass market launch with an MFI would be too complex, so we needed to find a compelling consumer proposition around which everything would be based.

A workshop with the Safaricom commercial team identified the key proposition as Send Money Home. In Kenya, as in most developing markets, many families have a small number of breadwinners who work away from home in order to

provide for the others. Practically every Kenyan I worked with sends money up country to some family members. They use various means to do so, ranging from sending heavily disguised parcels by bus or finding someone travelling that way and giving them the cash, both of which are risky in a country where highway robbery is literally a commonplace event, to more formal mechanisms such as Western Union and the like, which are less common as they are very expensive and there are few cash outlets in rural areas.

The launch service was therefore limited to three features providing the relatively simple functionality which made the consumer proposition much easier to understand and to use. Users could deposit in or withdraw cash at agent stores; transfer money person-to-person (P2P); and buy prepaid airtime.

However, every other modification we made to the service added complexity. In the latter stages of the pilot we had hired consultants from the electronic banking world to audit the system and make recommendations. Their suggestions included a major change in the design of the agent phone menus. In the pilot, each agent SIM was associated with one e-money float and one user. In practice, several shop assistants used the same phone and shared the not-so-secret PIN. A fundamental change was to split that one agent phone entity into four or more separate entities associated with the e-money float: the store; the M-PESA till; a primary assistant responsible for administering the till; and one or more standard assistants who could also use that till to do M-PESA transactions. Each operator is now identified by a unique Agent ID, usually their initials, and a genuinely secret PIN.

An ongoing issue was that agents ran out of e-money float. When customers deposited more cash than was deposited at an outlet, the e-money float was reduced, sometimes to the point where the agent ran out. To replenish this float the agent had to return cash to the M-PESA bank account so it could be reflected as an increase in M-PESA float. This could take several days to clear during which time the agent could not properly serve customers. For the launch, however, each agent would have several stores with e-money float, not just the one pilot outlet. This gave us the idea to create a whole new function we call float balancing. The logic goes that city stores will see lots of deposits from people wanting to send money home, and rural stores will see more withdrawals as people cash the money they have been sent. Whilst the money will never balance exactly in one agency, if we could provide a tool for agents to move float from stores with excess e-money to those that were running out, this could help relieve the problem. A web tool was duly created for the agent's corporate accountant to do this. For Head Offices without internet access, and for times when it is unavailable, we also created Head Office handset menus to do a similar job.

These and a wealth of other technical changes were made to the system. We also had to tackle any number of administrative requirements. Safaricom and Vodafone have formal, structured procedures that any new service introduction must follow, but for the pilot we had blithely ignored all but the most pressing of these with a view to getting the job done without drowning in bureaucracy. This was marginally acceptable for a small pilot, but for a full commercial launch we

had to resume playing by the rules. It took about four months to get the paperwork sufficiently buttoned down for a corporate launch.

Neither Safaricom nor Vodafone has a banking license. This means that management of the legal and regulatory structure of the business was a delicate matter. Many rounds of discussions with Kenyan and English lawyers, many straw men, and many heated debates later, we came out with a complex legal structure appropriate to running the M-PESA service in Kenya—operated locally by Safaricom, but owned, hosted, and developed by Vodafone. A new trust company was created.

We then needed to create a department within Safaricom to launch and run M-PESA. The first step was to recruit someone to head the department. During the course of the pilot I had identified the ideal internal candidate who was heading another department at the time. It took a while to convince her to accept the role, but since she agreed she has thrown herself into it with all the competence and enthusiasm expected.

Next came recruiting the rest of the team from Safaricom employees and external candidates. This was a challenge as there was no existing pool of subject matter experts. Therefore, the most important criteria were a good education, experience in telecoms or banking, and most important, the right attitude.

We busily prepared training materials for the agent stores in both English and Swahili, but the more we considered the logistics of providing training to 600 assistants scattered around the country before launch, the less likely it seemed that this could be adequately managed by our training team of four. The pilot had taught us of the need for repeated training sessions and repeated store visits post launch. Kenya is a big country with small roads, and to drive between towns is not easy. So we added a new line to the budget to pay for a sales training agency. Now, fifty trainers visit our agents on a regular basis to give any support required, provide merchandise, and generally keep an eye on things.

The Central Bank of Kenya clearly needed to be engaged regarding financial service regulation. We had met with the bank a few times during the pilot,

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although the numbers and consequent small risk made it of little interest to them. When we approached the Central Bank regarding the national launch, it was quite another matter. There followed a series of product demonstrations, requests for documentation, compilation of information, more questions, meetings of clarification, submission of a formal legal opinion, and so forth. E-money products such as M-PESA are new to Kenya so there is no clear regulation yet in place. Nevertheless, it was impressive how quickly the bankers' questions progressed from fairly basic to insightful and quite tricky. But we had done our homework and eventually the bank confirmed that it had no objection to the service launching. Ten days after receiving this letter, we launched.

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Reflections and Ramifications

The excellent early adoption rate of M-PESA in Kenya strongly suggests that the service meets a need in the market. Usage is significantly above expectations. Vodafone is already piloting the product in new markets will soon allow person-to-person transfers across international borders. Vodafone has also created a central team to coordinate the growth of this business.

If we agree with the assumption made in the Millennium Development Goals—that the private sector must be involved in the development agenda to achieve truly sustainable results—then challenge funds provide a useful mechanism to facilitate private-public sector partnerships. Through DFID's matching challenge grant, corporations such as ours have been able to reduce internal competition for capital, thereby allowing socially beneficial projects that might hold higher risk or have lower returns on investment to go ahead.

This experience also has reinforced the insight that there is no substitute for spending a significant amount of time at the start of a project on the ground assessing customer's needs well ahead of designing the functional specification of any technology-based solution. We also learned to keep it simple. When it came to moving from pilot to live system, a significant amount of the complexity in the product was stripped, allowing Safaricom to go to market with a very simple consumer proposition. Training is still a priority, but the burden is somewhat lighter than in the pilot. The disadvantage of putting consumers first was that the business requirements, such as Faulu's with back office information management systems, proved to be an obstacle to scale. It is clear that we need to provide a solution that allows easy integration with financial institutions.

A partnership approach was at the centre of the project. All parties had to be

prepared to embrace the consequences of change –and this is not easy for naturally conservative organizations that are not accustomed to working together. For this and all the other challenges we described, getting senior sponsorship along with a committed project team was critical.

We have since identified a plethora of new ways M-PESA can be used in Kenya and elsewhere. There is market demand for faster, cheaper, and more efficient ways of moving money for many reasons, ranging from bill payments to salary payments; affordable social payments to extending existing financial services; convenient-low cost international remittances; and many more. These have been prioritized and development is underway. M-PESA has just taken the important first step in what we hope will be a long journey in bringing people into the communications and financial mainstream worldwide.

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1. The Millennium Development Goals are a set of eight goals established through the U.N. with the aim of halving global poverty by the year 2015. For more information, see: <http://www.un.org/millenniumgoals/>
 2. Full details can be found at <http://www.financialdeepening.com>
 3. Swahili is a hybrid language consisting of Bantu, Arabic and a smattering of English which is the means by which the 42 tribes in Kenya communicate. Effectively it is a successful East African version of Esperanto.
 4. Subscriber Identity Modules (SIM) are removable cards that allow users to change phones easily by removing the SIM card and inserting it into another mobile phone, thereby eliminating the need for activation of the new mobile phone on the network. Wikipedia: http://en.wikipedia.org/wiki/Subscriber_Identity_Module