

Shrinking the Digital (and Financial) Divide:

A Lesson in Technology Leapfrogging and Financial Inclusion from Nairobi, Kenya's Mobile Banking Industry

ELLYSE MURPHY

Contact Information: elmurphy@design.upenn.edu

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Source: Tanveet Suri & William Jack



INTRODUCTION

In 2007, Kenya set down an entirely new path towards a more inclusive financial future. This opportunity came from an unexpected source: the country's leading mobile phone network operator, Safaricom. The company pioneered a mobile payment system, M-PESA, that reached more people in more locations faster than traditional banks will ever be able to. This rapid expansion of financial services not only helped the country surpass its financial inclusion goals, but also indirectly helped it meet its Millennium Development Goals targets, including reduced child mortality, near universal primary school enrolment, and narrowed gender gaps in education. The following paper discusses how leapfrogging to a robust cellular network caused a tectonic shift in not only the country's communications but in its financial landscape as well.

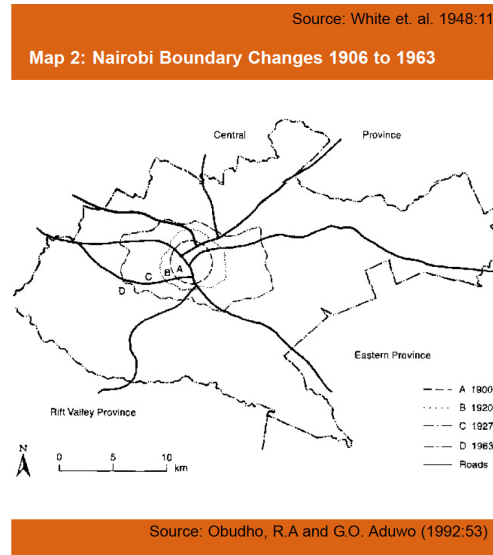
NAIROBI, KENYA: HISTORY AND CONTEXT

Kenya is located in the Eastern Africa sub-region, and its capital, Nairobi, lies at the southern end of Kenya's agricultural heartland. The city is just 1 degree south of the Equator, but due to its high altitude of 1,600–1,800 meters above sea level, it generally has a temperate tropical climate with cool mornings and evenings. There is typically a rainy season from April to June, although Nairobi has suffered from severe drought in recent years.

Nairobi has been the commercial and business hub of Kenya since the Kenya Uganda Railway headquarters was moved there from Mombasa in 1900. In 1907, Nairobi became the capital of Kenya, and soon thereafter was named as the capital of the British protectorate. Only several years later, much of the city's road network was established. The city continued to grow, both in terms of population and infrastructure, under British rule and in 1927 the city boundary was extended to cover 30 square miles. It remained under British rule until the end of World War II. After independence in the 1950s and '60s, the city began to experience rapid urbanization, with annual growth rates of 7 to 8%. In 1963, the official boundary of Nairobi, which had changed little since its

FIGURE 1:

Source: Winnie Mitullah



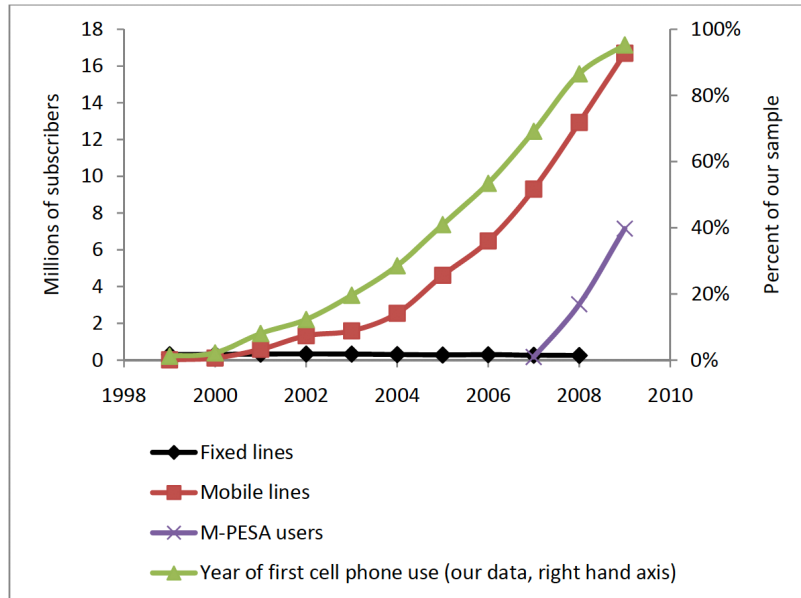
expansion under British rule, changed drastically. The boundary was extended to cover a sprawling area of 266 square miles, from which point there have been no changes (Figure 1).

Given its vast area, Nairobi currently has a population density between 10,000 and 12,000 people/square mile, a similar density to Western European cities like Dublin and Vienna, though the contrast in densities across the city is striking. For the vast Greater Nairobi Metropolitan Region, the density dilutes to an average of 560 people per square mile, while population density in Kibera, one of the largest slums in Africa, is a staggering 750,000 people per square mile. Averaging only 37 square feet per person, Kibera is, not surprisingly, one of the most crowded places on earth. Kibera is home to over 550,000 people, with an additional 2 million slum dwellers in 200 settlements in Nairobi. Slum dwellers comprise 60% of Nairobi's population, yet occupy only 6% of the land. While the rate of urbanization has decreased from its late 20th century levels, Nairobi is still one of the fastest growing cities in Africa, with an urban population of 3.2 million in 2015 and 4% growth annually, a result of both high birth rates and an influx of rural migrants searching for employment. This trend means that extreme density in Nairobi's informal settlements will likely only increase for the foreseeable future. While rural migrants come to Nairobi in search of higher wages, many remain below the poverty line, comprising 42% of Kenya's population. Kenya is one of the most unequal countries in the world, ranking 18th highest on the GINI Index at 46.5, and 11th in sub-Saharan Africa in 2005. This stark inequality has left the urban poor highly vulnerable to climatic, economic, and social shocks, and results in a Human Development Index (HDI) rank very near the bottom at 148 (2005).

In recent years, the Kenyan government has been proactive in trying to decrease inequality and improve quality of life. In 2010, Kenya enacted a new constitution that specifically addressed longstanding historical, geographic, and demographic issues and human rights violations that have hindered the country's path to progressive development. The new constitution devolved power from the national government to 47 new decentralized counties. This change has promoted increased grassroots investments, strengthened accountability, and improved local public service delivery. The government has also rolled out Vision 2030, which is intended to serve a new development blueprint for Kenya. Vision 2030 seeks to graduate the country from a low-income country to a medium-income country by 2030, largely by increasing the breadth and depth of access to formal financial services. From a 2007 baseline of 23% adult population formal financial inclusion,

FIGURE 2:

Source: Nick Hughes & Susie Lonie



the plan sets a goal of over 60% by 2030. Less than 15 years later, however, Kenya has already far surpassed this 2030 target; according to the most recent FinAccess Household Survey (2019), formal financial inclusion has soared to 82.9%.

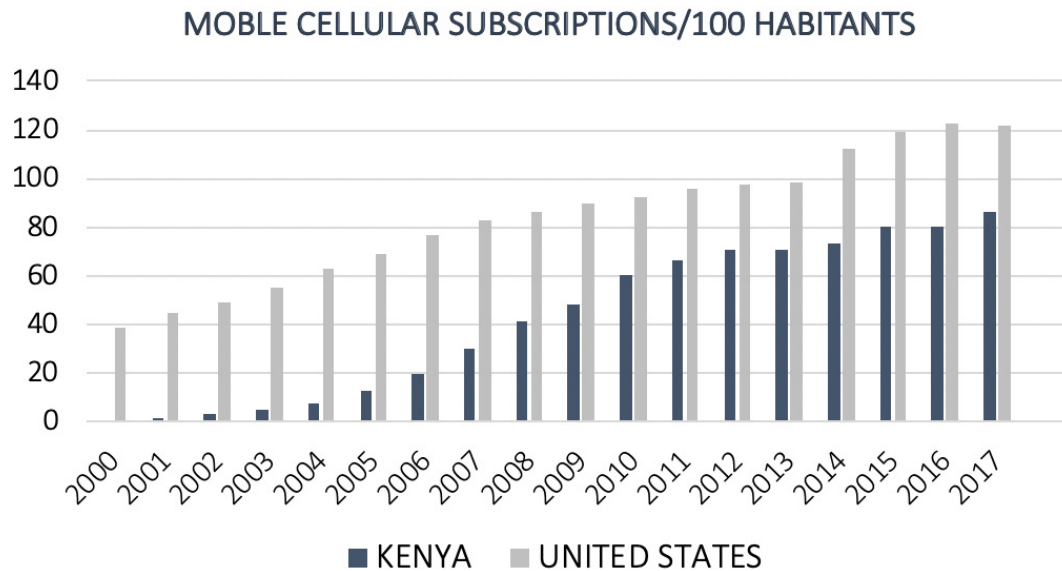
It is clear that this rapid transformation of the financial landscape could not have occurred, in a country with an HDI ranking of 148, through typical or conventional processes; it indicates a tectonic shift that set the country on a new path and pushed it forward. This shift was a technological leapfrog from limited landline infrastructure to a robust mobile cellular network, which made it possible for unbanked populations to have access to a bank account in the palm of their hands. The leading entity in this technological leapfrog is Vodafone, its mobile phone operator, Safaricom, and the mobile payment system, M-PESA, that the company launched using its mobile phone network.

TECHNOLOGY LEAPFROG: FROM LIMITED LANDLINE INFRASTRUCTURE TO EXTENSIVE MOBILE PHONE NETWORK

Throughout the 1980s, '90s, and the first half of the 2000s, developing countries, particularly those in sub-Saharan Africa, lagged far behind more developed countries in adopting information communication technologies (ICT), which revolutionized the way people do business, communicate, and even think. The resulting "digital divide," defined as the disparity between two or more countries or regions in their access to digital technology, only exacerbated existing disparities between developed and developing countries; the lack of electronic means of communication made developing countries increasingly invisible to, and marginalized by, the mainstream forces of economic growth. In 1995, for instance, only 4 out of 55 African countries had an internet presence, and just 1 in 10,000 (or .01%) Africans had internet access, compared to 15% in the United States. A similar digital divide existed with mobile cell phone networks. In 2000, just 0.413% of the population (130,000 people) had a mobile cell phone subscription in Kenya, compared to 39% in the US.

FIGURE 3:

Source: Statista Data



Beginning in the mid-2000s, however, this great divide began to shrink. As developed countries produced new and improved iterations of technologies, and market competition increased, the cost of obtaining ICT began to fall. Kenya was in a favorable position to capitalize on these reduced costs, as it was unhindered by entrenched, and increasingly obsolete, landline infrastructure. Vodafone, and its Kenyan mobile operator Safaricom, began rapidly expanding Kenya's mobile cellular network in the mid-2000s, largely bypassing investment in and adoption of landline connections. This phenomenon is often referred to as technology leapfrogging, the adoption of advanced information and communication technology in an application area where immediate prior technology has not been adopted. Kenya's technology baseline was roughly 300,000 landlines, which, even at their peak in 1999, represented a small and inefficient fixed-line telephone system (Figure 2). By 2008, the number of landlines had dropped by 50,000, whereas mobile phone subscriptions had increased from virtually zero to nearly 17 million over the same time period. Today, Kenya has less than 70,000 landlines, ranking it 149th in the world in terms of size, compared to almost 120 million in the US, ranking it number 2 in the world in an increasingly obsolete technology. On the other hand, Kenya now has a mobile cellular subscription of 90 per 100 inhabitants, ranking it number 33 in the world for number of mobile cellular subscriptions, at nearly 43 million, which is particularly impressive given Kenya's modest population size of 44 million (Figure 3).

Shrinking the digital divide and increasing ICT adoption has been recognized as a means for accelerating development and promoting economic growth, and Kenya provides a particularly convincing case study in support of this view. The extensive mobile network that Safaricom implemented throughout the country spurred yet another technology leapfrog: from a large unbanked population to a large mobile banking population. The M-PESA system has been the primary driver of this leap, which has produced a discernible

decrease in extreme poverty and improvement in quality of life. M-PESA's origin and initial design were key contributing factors to its success in increasing financial inclusion for the 60% of Nairobians who live in informal settlements.

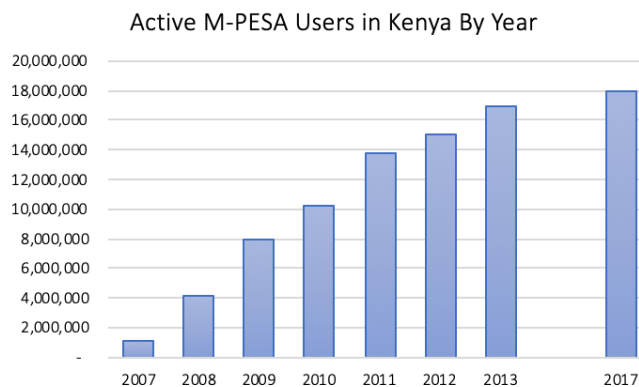
M-PESA ORIGIN AND OVERVIEW

In 2007, Vodafone launched M-PESA, an SMS-based system of texting small payments between users, which would fundamentally change how many Kenyans handled their finances. The impetus to develop a product like M-PESA began in 2003 at the World Summit for Sustainable Development. Vodafone, a young telecom company that had made proactive management of its impact on society a priority, brought on executive Nick Hughes to help the company understand its role in addressing the Millennium Development Goals. While attending the summit, Nick connected with a UK government representative who managed a challenge fund project set up by the Department of International Development (DFID). The DFID had established a Financial Deepening Challenge Fund (FDCF), which earmarked £15 million for joint investments with the private sector on projects that help improve access to financial services. Hughes saw this as an excellent opportunity to harness public funds to make a higher risk, lower return (at least in the short run) sustainable development project financially feasible. Vodafone uses internal competition to allocate funds to their projects, which means that projects with lower return on investment, such as development agenda initiatives, often get squeezed out.

In mid-2003, Hughes submitted a proposal which outlined the M-PESA system and highlighted the unmet need it would fill to FDCF. FDCF awarded £1 million of funding to the proposal, which Vodafone matched. To design and test the platform, Vodafone created a pilot partnership between Safaricom (its network operator), a microfinance institute (MFI), and a commercial bank. A key component of the project was to use Safaricom's existing distribution network of airtime resellers, so that receiving and repaying small loans was as convenient and simple as airtime top-ups. Another critical success factor was the decision to use basic mobile phones instead of an app or point of sale (POS) devices and magnetic stripe cards. The project was specifically targeting the unbanked population, and at the time, smart phones were not abundant in Kenya, so an app would likely serve as a barrier to entry. POS devices were unsuitable, as they are expensive and require maintenance, which would preclude retailers in poorer areas from becoming M-PESA agents, and thus preclude access to the system's target population. Two years later, in October 2005, the M-PESA system was ready for its pilot launch. The pilot proved to be a success, with evidence of appropriate product functionality, healthy profit margins, and ability to meet consumer needs in Kenya and other developing countries, resulting in executive approval of a full M-PESA launch when the pilot concluded in 2006.

FIGURE 4:

Source: Safaricom User Data



The full-fledged launch of M-PESA in Kenya required extensive negotiations with the Kenyan government for several reasons. Neither Vodafone nor Safaricom has a banking license, so determining the regulatory structure of a mobile payment system was complex. In addition, Kenya did not have any specific regulations in place, as M-PESA was the first e-money product to enter the country. Not only were there no existing mobile money platforms, but only 20% of the adult population had a mobile phone and only 18% had a formal bank account during these negotiations in 2006. The Central Bank of Kenya (CBK) requested documentation, answers to questions, and clarifications on the system on a case by case basis, as there were no precedents. Likely recognizing the potential M-PESA had to fill a large unmet need, however, CBK confirmed that it had no objections to the launch of M-PESA after less than 6 months of negotiations.

Just one month after M-PESA's March 2007 launch, Safaricom had registered 20,000 M-PESA customers, substantially exceeding the numbers outlined in the business plan. M-PESA began to expand rapidly, and by the end of the first year, it had 1 million users. From 2008 to 2011, M-PESA increased its active users by several million each year, as seen in Figure 4. Active user data by year for 2014-2016 is unavailable, likely due to the leveling off of the platform's exponential growth, because by 2017, there were 18 million users, representing adoption by 96% of households. In terms of scale of transactions, in 2016, 600-630 million were processed monthly, a volume that used to represent a year's worth of transactions. The value of these transactions is over \$3.5 billion per year.

M-PESA AND FINANCIAL INCLUSION

From the beginning, the M-PESA platform was intended to fill the large unmet need for a secure way to save and receive money in the unbanked population and increase financial inclusion. Through its simpler user interface and kiosk network, the system largely achieved these goals, but there were challenges and setbacks along the way.

FIGURE 5:

Source: Tanveet Suri & William Jack

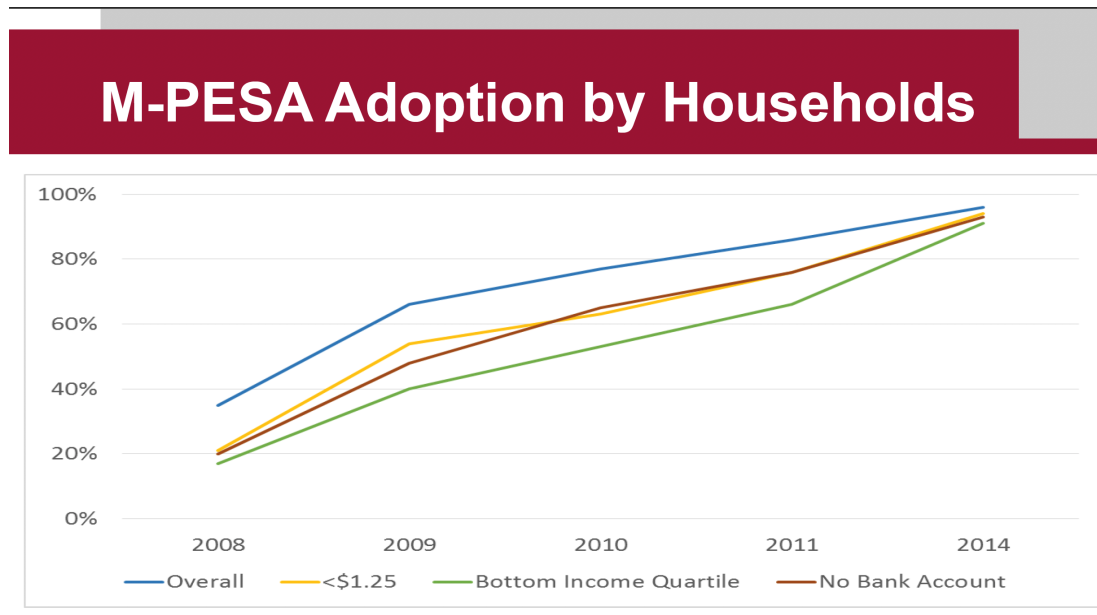
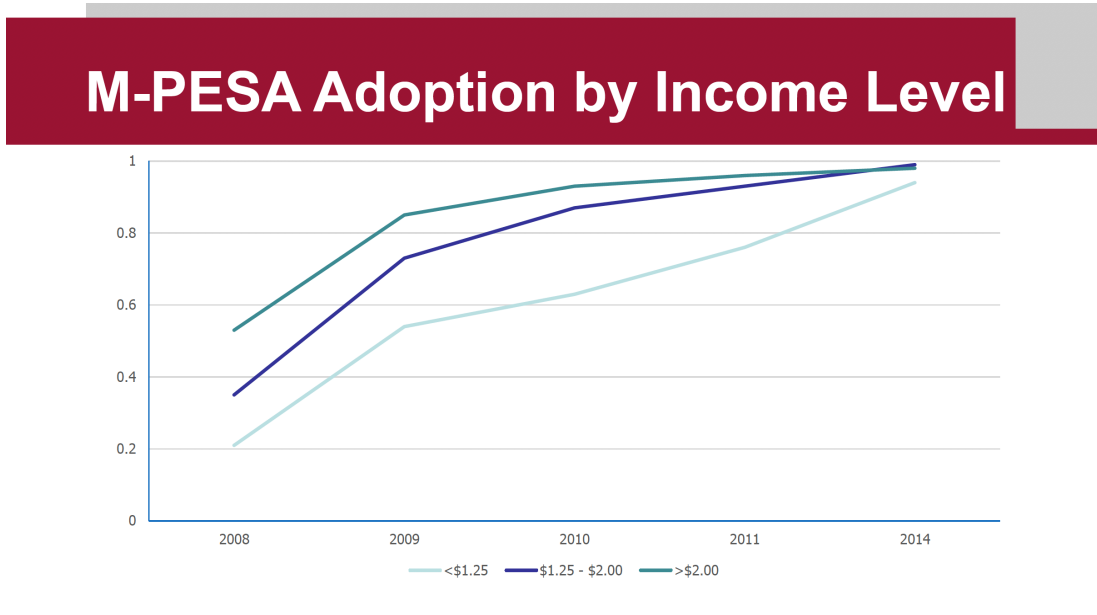


FIGURE 6:

Source: Tanveet Suri & William Jack



M-PESA USERS AND USER EXPERIENCE

The pilot team that Vodafone created carefully assessed and documented a demonstrated need for financial services among unbanked populations to inform the platform's design. Faulu Kenya, an MFI located 20-30 minutes walking distance from Kibera, was selected to be part of this team because it has several thousand borrowers who run small businesses in Nairobi. Most of Faulu's customers make payments on their loans on a weekly basis, but the process is time-consuming and costly. Borrowers typically form a group and elect a group treasurer and meet weekly to submit their cash to him or her. The treasurer, along with several other group members for protection, then travels, typically by bus, to the bank to make the deposit. This system requires a lot of coordination among numerous people, and money for transportation, not to mention the opportunity cost of missing business while they are away.

Even though this laborious process is a reality for most informal settlers who have taken out a loan, are sending remittances to family in rural areas, or need cash, low-income households initially accounted for a small portion of M-PESA's customer base. The bottom quartile of the income distribution accounted for just 10% of all users in 2008, while 37% of users were in the top quartile (Figure 6). The share of unbanked users initially was also lower than anticipated, at 20% in 2008, but in 2009 it increased to 50%. By 2009, 50% of unbanked households had an M-PESA account (Figure 5). From 2009 on, the system continued to reach more low income and unbanked households.

One advantage M-PESA offers for low income populations in informal settlements and elsewhere is a less burdensome registration experience. The only documentation needed to register for an account is a valid identification document which can be any of the following:

- Kenyan National ID
- Valid Kenyan Passport
- Valid Foreign Passport
- Kenya Military ID
- Kenyan Foreigner Certificate

To register for an account, customers must have a mobile phone and a Safaricom SIM card. Because many of the unbanked already have a mobile phone and Safaricom is the dominant mobile operator in the country, it is likely that potential users will already have a mobile phone and the Safaricom SIM card, which decreases or eliminates start-up costs of an account. It also means that the user is less likely to encounter difficulty using the system, since it uses their existing device and there is not a separate smartphone app available in Kenya.

Another barrier to entry that M-PESA has lowered is transaction minimums and transaction costs. At just 10 shillings minimum transaction, M-PESA focuses on the “one shilling” or small transactions, which is much lower than traditional banks’ minimums. M-PESA has also reduced transaction costs: for a customer sending money electronically an average distance of 200 kilometers, it costs an M-PESA customer 35 Kenyan shillings versus 460 shillings for a bus. This has improved the lives of Nairobians as they spend less time and money sending home remittances to family in rural areas. The simple change of being able to deposit and store money electronically has had profound impacts on financial behaviors and security in Kibera. Muggings and pickpocketing used to be rampant in Kibera, given that many people did not have, or could not easily access, an electronic place to store their money. With M-PESA, people carry less cash now and community members say that safety has improved as thieves have caught on to this. Many community members surveyed reported this has led to a better quality of life.

Interestingly, M-PESA has significantly improved financial inclusion among women and increased their financial independence. Women in Kibera and across Kenya remark that if they have cash in their pocket, their husbands would take their money. With M-PESA, women could either claim they did not have any money or could refuse to turn it over. Being able to keep deposits and withdrawals private increases their financial autonomy by giving them more control over how, why, and when the money is spent. Given women’s higher propensity to save and different spending patterns than men, the positive impacts M-PESA has had on consumption levels and poverty reduction has been more pronounced in female-headed households. Access to mobile money has allowed women to better protect themselves against income and health risks by allowing them to draw on a wider network of social support. With M-PESA, they received more remittances more quickly from more different types of people in response to negative shocks.

M-PESA AGENT KIOSKS

The timing and locations of M-PESA agent kiosk openings likely affected when low income and unbanked households had access to the system. Initial agent kiosks were in more centrally located areas of Nairobi, likely due to the high financial barrier of becoming an M-PESA agent. This likely meant that the kiosk model did not provide increased customer convenience and that residents in poorer areas did not know about the system. To become an M-PESA agent, Safaricom requires that an individual (or company) have sufficient capital to start at least three shops in separate locations. Safaricom also requires a minimum investment of 100,000 Kenyan shillings (roughly \$1,300 in 2010) per M-PESA shop. This money serves as the shop’s working e-float balance. Because of the three-shop minimum and e-float requirement, more informal and creative tactics to eventually become an agent have evolved over time in Kibera and elsewhere. One avenue that Safaricom allows is for an individual to collaborate with an existing M-PESA agent to open up a new shop. The existing agent would own the new shop, but the individual would manage the e-float for it as an employee. These “sub-agents” can

gradually save enough to meet the capital requirements. Yet another model that has cropped up is several individuals or companies pooling their resources to reach the three-shop minimum, and then each running one shop. There are a number of informal financing mechanisms used to reach the agent capital requirements. Many use the profits and savings from their informal businesses, as well as loans from family members, and unofficial agreements with M-PESA agents and other entrepreneurs trying to become one. It is difficult if not impossible for many Nairobians to get a loan and unfortunately, MFIs in Kenya are limited in number, size, and scope.

Despite these challenges, the M-PESA agent kiosk network has been able to expand to meet the continued increase in user demand. According to the most recent Safaricom database on agent locations (2011), there were 5,300 agents in Nairobi. These agent kiosks have penetrated all neighborhoods of Nairobi, with kiosks throughout Kibera and other informal settlements. In Kibera in 2009 there were 50 M-PESA agents, and this number has continued to grow substantially each year (Figures 7 and 8). By 2015, the country's average distance to the nearest M-PESA agent was only 1.4 kilometers, and more than half of Kenyan households lived less than 1 kilometer from an agent. This penetration throughout different parts of the city and country is significant, given that the average distance to the nearest bank was 9.2 kilometers when M-PESA started, and 20% of households lived more than 20 kilometers from a bank branch. In addition, the entire country only had 2,700 ATMs in 2016. The sparse coverage meant that poorer areas frequently did not have easy access to an ATM to deposit or withdraw funds. To this day, there are still no banks in Kibera.

FIGURE 7: M-PESA AGENTS LINE STREETS IN KIBERA

Source: Google Earth



By allowing businesses in informal settlements to have easily accessible, instantaneous transfers of funds, many of them for the first time, the M-PESA system has been instrumental in creating a better business environment. Small business owners can now pay their vendors electronically, streamlining the time and expense of transactions. Business owners can also pay bills, utilities, and other recurring expenses via the M-PESA system, simplifying their bookkeeping and operations. In this way, M-PESA has mainly helped existing businesses, although there has been an increase in small, informal businesses such as vegetable sellers and women who make foodstuffs for sale. The M-PESA agents and kiosks have provided additional employment opportunities, although in relatively small numbers. An M-PESA outlet generally hires one to three employees, or one additional employee to manage M-PESA in an existing business. Some M-PESA agents have been able to expand from the initial three shops to over 20, and report that M-PESA has substantially increased employment opportunities in their communities.

CHANGES IN GOVERNMENT REGULATIONS

Safaricom and the M-PESA kiosks began to dominate the mobile phone and mobile payment sector across the country. Safaricom had, and still has, 80% of the market share for mobile phones in Kenya. Recognizing the success of the M-PESA model and protecting against a monopoly, in 2010 the Central Bank of Kenya introduced new legislation that enabled formal banks to contract with third-party agents. CBK issued guidelines for how banks could participate in the agent model and what services they might offer. These guidelines differ from the M-PESA agent regulations, which are set by Safaricom, and banks have been wary of entering into this new model. Nevertheless, it was an important step towards deepening existing financial inclusion initiatives.

FIGURE 8: M-PESA AGENTS LINE STREETS IN KIBERA

Source: Google Earth





RECOMMENDATIONS

The M-PESA system launch in Nairobi provides an excellent case for study, as it addresses several difficult problems in a relatively simple manner, but there are things that public and private actors can do to maximize M-PESA's reach, value to customers, and positive impacts on communities. As other countries look to implement similar programs, they can learn from the successes and missed opportunities of M-PESA in Kenya. The following are recommendations from a planning perspective and on who should take the lead in implementing them.

RECOMMENDATIONS FOR THE CENTRAL BANK OF KENYA

As previously discussed, the Central Bank of Kenya facilitated the country's financial transformation in two important ways: it engaged in productive and expedient negotiations with Safaricom and allowed the M-PESA system to launch and it revised laws regarding formal banks and agents. This suggests that CBK is pro-business, but also monitoring for monopolies and abuses in the banking industry. To build on this new model of third-party agent kiosks for formal banks, CBK can advise and recommend or even require that banks expanding to this model develop a diverse range of financial products so that a wide range of customers can find a plan that works for them and that they have options depending on risk preference or goals.

RECOMMENDATIONS FOR MFIS

M-PESA has been proactive in forming agreements or collaborations with organizations that many would consider competitors. For instance, Safaricom has partnered with ATMs to facilitate M-PESA withdrawals, and after the 2010 regulation change, M-PESA has partnered with formal banks such as Equity Bank who are interested in the agent banking model but in need of a partner with experience in the industry. It is surprising, therefore, that the M-PESA system is not more integrated with MFI's, even though Faulu was involved in its design and implementation. An obvious synergy between M-PESA and MFIs would be for the MFIs to at least accept loan payments via M-PESA. As described earlier, the process of getting the loan money to the bank is expensive and time-consuming. If MFIs used the M-PESA system, borrowers could send funds instantly. MFIs could also increase their role in originating loans for entrepreneurs interested in becoming an M-PESA agent. The businesses have proved to be profitable in addition to providing additional small benefits to the community, so it seems like an attractive investment for these types of organizations.

RECOMMENDATIONS FOR LOCAL OR COMMUNITY PLANNERS

Local leaders in their communities or community-level planners can have an important role in fostering entrepreneurship and increasing financial inclusion. One key method of doing this is to create and foster a network for local businesses and entrepreneurs. Having an additional support network in large cities or informal settlements has numerous benefits to those who are aspiring or current business owners, and the cost is minimal. With regard to M-PESA specifically, this network could help connect individuals who have sufficient resources to start one M-PESA kiosk, but don't have enough saved to become a full M-PESA agent. By pooling resources together, they can each become owners of a kiosk, which has a much higher income potential than being an employee.

RECOMMENDATIONS FOR MUNICIPAL OR NATIONAL PLANNERS

Planners can help small businesses and entrepreneurs at the city and national level as well. In general, regulations that favor or are tailored to the needs of national corporations can place undue burden on

entrepreneurs and small businesses. The problems typically center around high barrier to entry issues, such as extensive licensing and permitting requirements, large fees or taxes on business permits or revenue, and exclusionary loan criteria. Through careful analysis of the existing business and economic environment in their city or country, planners can promote using a different set of guidelines for small businesses, which will hopefully increase the number of business owners. The case can be made that these tailored regulations can increase the city's revenues, as a larger number of formal business licenses could increase the city's tax base.

The next recommendation for municipal and national planners is to promote continued investment in technology. This general recommendation can, and should, be implemented in several different ways in different application areas. The first is to improve technology internally in government facilities and incorporate it into government operations, platforms, and initiatives. The government should prioritize having the capability for users to pay bills, utilities, and other recurring expenses online. While it should still accept analog forms of payment so as not to exclude people, having the option to pay digitally will help residents streamline their finances and provide increased security. In 2010, only one third of M-PESA customers used the service to pay bills or utilities. The M-PESA SIM card system incorporated a user-friendly bill payment functionality from the onset, so there are likely other reasons why more customers are not taking advantage of this feature.

Another capacity in which governments should prioritize technology is investment in improved technological infrastructure. Many developing countries are eager to adopt ICT as it becomes more affordable and the link between technology and improved financial and quality of life outcomes becomes increasingly apparent. M-PESA would not have been the success that it is today if Safaricom had not already had a significant existing mobile phone network in the country. Governments should set technological and financial targets in planning and visioning documents to provide an attractive business and economic climate for technology companies. As previously mentioned, Kenya identified increased financial inclusion as an important component of its Vision 2030 plan, and it was able to far exceed this target because it had allowed for a continuous and stable rollout of mobile phone networks. The Kenyan Government and the Central Bank of Kenya then approved the launch of a completely new financial system after several months of due diligence. This recommendation is admittedly hard to achieve, because it essentially boils down to having non-corrupt government officials who care about the good of the country, which is the crux of the problem for many developing nations.

CONCLUSION

Less than 15 years ago, Kenya was a highly unequal country, with less than one fifth of its adult population having access to a formal bank account. The country took advantage of falling ICT costs by prioritizing investment in technology and maintaining a government that was stable enough to attract foreign investment. The result was a technological leapfrog to a robust mobile cellular network in less than 20 years, which set the stage for future innovation. The country was able to far surpass its targets for financial inclusion in less time, because it leapfrogged over traditional methods of financial inclusion to mobile payment systems and mobile banking. Other developing countries can and should capitalize on falling ICT costs and integrate technology into the everyday lives of citizens in order to propel it towards a more connected, inclusive future.

NOTES

1. United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
2. Winnie Mitullah, "The Case of Nairobi, Kenya," *UNDERSTANDING SLUMS: Case Studies for the Global Report on Human Settlements*, 2003, https://www.ucl.ac.uk/dpu-projects/Global_Report/pdfs/Nairobi.pdf.
3. Winnie Mitullah.
4. National Council for Population and Development, "Kenya Population Situation Analysis: Nairobi," *Kenya Population Situation Analysis*, 2013, https://www.unfpa.org/sites/default/files/admin-resource/FINALPSAREPORT_o.pdf.
5. World Bank, "World Development Indicators Database," July 6, 2018.
6. UNICEEF. 2014. *Kenya at a Glance*.
7. The World Bank. 2019. *Kenya Overview*. March 28.
8. Kenya. et al., *Kenya : Vision 2030* (Nairobi: Government of the Republic of Kenya, Ministry of Planning and National Development and the National Economic and Social Council (NESC), Office of the President, 2007).
9. finaccess; Central Bank of Kenya, "2019 FinAccess Household Survey," February 2019.
10. Napoli, Philip M., and Jonathan A. Obar. 2013. "New America Foundation ." *Mobile Leapfrogging and Digital Divide Policy: Assessing the limitations of mobile Internet access*. April.
11. Napoli, Philip M., and Jonathan A. Obar.
12. ITU. *Number of mobile cellular subscriptions per 100 inhabitants in Kenya from 2000 to 2017*.
13. ITU. *Number of mobile cellular subscriptions in the United States from 2000 to 2017 (in millions)*.
14. Central Intelligence Agency. 2017. *The World Factbook: Country Comparison- Telephones-Mobile Cellular*.
15. Central Intelligence Agency.
16. Nick Hughes and Susie Lonie, "M-PESA: Mobile Money for the 'Unbanked' Turning Cellphones into 24-Hour Tellers in Kenya," *Innovations: Technology, Governance, Globalization* 2, no. 1–2 (April 1, 2007): 63–81, <https://doi.org/10.1162/itgg.2007.2.1-2.63>.
17. Safaricom Limited, "Celebrating 10 Years of Changing Lives," 2017, https://www.safaricom.co.ke/mpesa_timeline/.
18. Mas, Ignacio, and Dan Radcliffe. 2010. "Mobile Payments go Viral: M-PESA in Kenya." *Bill & Melinda Gates Foundation*.
19. Hughes and Lonie, "M-PESA: Mobile Money for the 'Unbanked' Turning Cellphones into 24-Hour Tellers in Kenya."
20. Tavneet Suri and William Jack, "The Long-Run Poverty and Gender Impacts of Mobile Money," *Science* 354, no. 6317 (December 9, 2016): 1288, <https://doi.org/10.1126/science.aah5309>.

21. Megan Plyler, Sherri Haas, and Geetha Nagarajan, "Community-Level Economic Effects of M-PESA in Kenya: Initial Findings," June 2010.
22. Plyler, Haas, and Geetha Nagarajan.
23. Suri and Jack, "The Long-Run Poverty and Gender Impacts of Mobile Money," December 9, 2016.
24. Sherri Haas; Megan G. Plyler; Geetha Nagarajan, "Outreach of M-PESA System in Kenya: Emerging Trends," June 2010.
25. Effie Kemunto Ombutora; Fred Mugambi, "Role of Agency Banking on the Performance of Banking Agent Entrepreneurs: A Case Study of Co-Operative Bank Co-Op Jirani in Kibera, Nairobi.," *International Journal of Social Sciences and Entrepreneurship* 1, no. 5 (n.d.): 243–56.
26. Safaricom Limited, "M-PESA Authorised Agents," 2011.
27. Claudia McKay; Mark Pickens, "Branchless Banking 2010: Who's Served? At What Price? What's next?," *CGAP Focus Note* 66 (September 2010).
28. Plyler, Haas, and Geetha Nagarajan, "Community-Level Economic Effects of M-PESA in Kenya: Initial Findings."
29. Plyler, Haas, and Geetha Nagarajan.
30. Plyler, Haas, and Geetha Nagarajan.
31. Matu Mugo, "Regulation of Banking and Payment Agents in Kenya," *Innovations: Technology, Governance, Globalization, MIT Press* 6, no. 4 (October 2011): 125–32.
32. Matu Mugo.
33. Olga Morawczynski; Mark Pickens, "Poor People Using Mobile Financial Services: Observations on Customer Usage and Impact from M-PESA," *CGAP Brief*, 2009.

BIBLIOGRAPHY

- Bizna Kenya. "How to Become an M-Pesa Agent." Bizna Kenya, May 29, 2018. <https://biznakenya.com/how-to-become-an-m-pesa-agent/>.
- Central Intelligence Agency. 2017. *The World Factbook: Country Comparison- Telephones-Mobile Cellular*. <https://www.cia.gov/library/publications/the-world-factbook/fields/197rank.html#KE>.
- Claudia McKay; Mark Pickens. "Branchless Banking 2010: Who's Served? At What Price? What's next?" *CGAP Focus Note* 66 (September 2010).
- Demircuc-Kunt, Asli, Leora Klapper, Dorothe Singer, Saniya Ansar, and Jake Hess. 2017. "The Global Findex Database: Measuring Financial Inclusion and the Fintech Revolution." *World Bank Group*.
- Demombynes, Gabriel Thegeya, Aaron. *Kenya's Mobile Revolution and the Promise of Mobile Savings*. Policy Research Working Papers. The World Bank, 2012. <https://doi.org/10.1596/1813-9450-5988>.
- Diop, Makhtar. 2017. "Africa can enjoy leapfrog development." *The World Bank*. October 11. <http://www.worldbank.org/en/news/opinion/2017/10/11/africa-can-enjoy-leapfrog-development>.
- Effie Kemunto Ombutora; Fred Mugambi. "Role of Agency Banking on the Performance of Banking Agent Entrepreneurs: A Case Study of Co-Operative Bank Co-Op Jirani in Kibera, Nairobi." *International Journal of Social Sciences and Entrepreneurship* 1, no. 5 (n.d.): 243–56. finaccess; Central Bank of Kenya. "2019 FinAccess Household Survey," February 2019.
- Hove, Leo Van, and Antoine Dubus. 2019. "M-PESA and Financial Inclusion in Kenya: Of Paying Comes Saving?" *Sustainability*.
- Hughes, Nick, and Susie Lonie. "M-PESA: Mobile Money for the 'Unbanked' Turning Cellphones into 24-Hour Tellers in Kenya." *Innovations: Technology, Governance, Globalization* 2, no. 1–2 (April 1, 2007): 63–81. <https://doi.org/10.1162/itgg.2007.2.1-2.63>.
- Kenya., Ministry of Planning and National Development., Kenya., and National Economic and Social Council. *Kenya : Vision 2030*. Nairobi: Government of the Republic of Kenya, Ministry of Planning and National Development and the National Economic and Social Council (NESC), Office of the President, 2007.
- Lonie, Susie. *M-PESA: Finding New Ways to Serve the Unbanked in Kenya*, 2010.
- M. Mbiti, Isaac, and David Weil. *Mobile Banking: The Impact of M-Pesa in Kenya*, 2011. <https://doi.org/10.3386/w17129>.
- Macharia, Jimmy, and Adekunle Okunoye. 2013. *Mobile Banking Influence on Wealth Creation for the Unbanked*. February. <http://erepo.usiu.ac.ke:8080/xmlui/bitstream/handle/11732/783/Paper%20Template%20of%20WJMS%20%28Use%20%E2%80%9CTitle%20of%20Paper%E2%80%9D%20style%29.pdf?sequence=4&isAllowed=y>.
- Mas, Ignacio, and Dan Radcliffe. 2010. "Mobile Payments go Viral: M-PESA in Kenya." *Bill & Melinda Gates Foundation*.
- Matu Mugo. "Regulation of Banking and Payment Agents in Kenya." *Innovations: Technology, Governance, Globalization, MIT Press* 6, no. 4 (October 2011): 125–32.

- Mbogo, Marion. *The Impact of Mobile Payments on the Success and Growth of Micro-Business: The Case of M-Pesa in Kenya*. Vol. 2, 2010. <https://doi.org/10.4314/jolte.v2i1.51998>.
- Monks, Kieron. 2017. *M-Pesa: Kenya's Mobile Money Success Story Turns 10*. February 24. Accessed March 30, 2019. <https://edition.cnn.com/2017/02/21/africa/mpesa-10th-anniversary/index.html>.
- Morawczynski, Olga. "Exploring the Usage and Impact of 'Transformational' Mobile Financial Services: The Case of M-PESA in Kenya." *Journal of Eastern African Studies* 3, no. 3 (November 1, 2009): 509–25. <https://doi.org/10.1080/17531050903273768>.
- Napoli, Philip M., and Jonathan A. Obar. 2013. "New America Foundation ." *Mobile Leapfrogging and Digital Divide Policy: Assessing the limitations of mobile Internet access*. April. <https://poseidon01.ssrn.com/delivery.php?ID=1710940661150200951151151080031220960250470710160270280670900660980130190050280761020300990020200541121250671130680851241041150380730390530681270050840701230781090240580600210060970920230180070220660270040861210>.
- National Council for Population and Development. "Kenya Population Situation Analysis: Nairobi." *Kenya Population Situation Analysis*, 2013. https://www.unfpa.org/sites/default/files/admin-resource/FINALPSAREPORT_o.pdf.
- Olga Morawczynski; Mark Pickens. "Poor People Using Mobile Financial Services: Observations on Customer Usage and Impact from M-PESA." *CGAP Brief*, 2009. <http://documents.worldbank.org/curated/en/943831468149671681/Poor-people-using-mobile-financial-services-observations-on-customer-usage-and-impact-from-M-PESA>.
- Oxfam. 2012. "Cash Transfers in Nairobi's Slums: Improving food security and gender dynamics." *Gender Equality in Emergencies*.
- Plyler, Megan, Sherri Haas, and Geetha Nagarajan. "Community-Level Economic Effects of M-PESA in Kenya: Initial Findings," June 2010.
- Ramirez, Vanessa Bates. 2018. "Leapfrogging Tech Is Changing Millions of Lives. Here's How." May 6. <https://singularityhub.com/2018/05/06/leapfrogging-tech-is-changing-millions-of-lives-heres-how/#sm.oooookw6xumfyegzfa7xoecjlf>.
- Safaricom Limited. "Celebrating 10 Years of Changing Lives," 2017. https://www.safaricom.co.ke/mpesa_timeline/.
- . "M-PESA Authorised Agents," 2011.
- Sherri Haas; Megan G. Plyler; Geetha Nagarajan. "Outreach of M-PESA System in Kenya: Emerging Trends," June 2010.
- Suri, Tavneet, and William Jack. "The Long-Run Poverty and Gender Impacts of Mobile Money." *Science* 354, no. 6317 (December 9, 2016): 1288. <https://doi.org/10.1126/science.aah5309>.
- . "The Long-Run Poverty and Gender Impacts of Mobile Money." *Science* 354, no. 6317 (December 9, 2016): 1288. <https://doi.org/10.1126/science.aah5309>.
- Winnie Mitullah. "The Case of Nairobi, Kenya." *UNDERSTANDING SLUMS: Case Studies for the Global Report on Human Settlements*, 2003. https://www.ucl.ac.uk/dpu-projects/Global_Report/pdfs/Nairobi.pdf.
- World Bank. "World Development Indicators Database," July 6, 2018.