

Digital Technology and State Capacity in Kenya

Njuguna Ndung'u

Abstract

Following the launch of M-Pesa in 2007, Kenya has emerged as a global leader in the development of mobile money and in increasing rates of financial inclusion. This paper shows how M-Pesa's success has led to a series of endogenous innovations that have shaped Kenya's digital space, placing it ahead of other developing economies in the region in the deployment and use of digital technology. It also explains how the mobile financial services revolution enabled the government to implement its e-governance strategy to better provide a range of services and opportunities to beneficiaries of public programs, business, taxpayers and investors, as well as dynamizing the private sector.

At the same time, even as it contributes to strengthening state capacity, the digital revolution makes new demands on the state, and the paper outlines several important challenges that Kenya will need to address in order to further consolidate its success. These include improving connectivity across the country, ensuring a fully interoperable mobile payments platform and implementing measures to strengthen consumer protection. Another important focus for the future is to transition to a fully digital identification (e-ID) system. The thrust of the paper is to provide inspiration and guidance for other countries to use Kenya's achievements as an example.

Center for Global Development
2055 L Street NW
Fifth Floor
Washington DC 20036
202-416-4000
www.cgdev.org

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Njuguna Ndung'u

Former Governor of the Central Bank of Kenya, 2007-2015

nsnjuguna@ndungu.co.ke

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Center for Global Development
2055 L Street NW
Washington, DC 20036

202.416.4000
(f) 202.416.4050

www.cgdev.org

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Preface

The M-Pesa revolution that launched Kenya to a leading position in the development of mobile money has led the way to the systematic study of the potential of digital finance to improve lives and strengthen state capacity. As Governor of Kenya's Central Bank over the period 2007-2015, Dr. Njuguna Ndung'u is uniquely placed to offer a perspective on Kenya's digital financial development, and the endogenous innovations that have continued to shape Kenya's digital space. As he notes, even as it contributes to strengthening state capacity, the digital revolution raises new challenges for the state, and the paper outlines several important challenges that Kenya will need to address in order to further consolidate its success. The objective of the paper is to provide inspiration and guidance for other countries to use Kenya's achievements as an example.

Alan Gelb
Senior Fellow
Center for Global Development

1. Introduction

Over the last decade, mobile phone-based financial services have spurred financial inclusion and the growth of a vibrant financial market in Kenya. These developments started in March 2007 when M-Pesa, a mobile payment platform, was launched as a partnership between Safaricom, a telecommunication (telco) company, and the Commercial Bank of Africa, a commercial bank in Kenya. The novelty of M-Pesa was that a telco agent would transform cash into electronic units of money and store them on a SIM card while simultaneously reading them into a trust account at the commercial bank. Once that process was complete, the funds in the SIM card would be available for transfer or payments.

M-Pesa's success has led to a series of endogenous innovations that have shaped Kenya's digital space. These ongoing innovations place Kenya ahead of other developing economies in the region in the deployment and use of digital technology. Kenya leads the world in mobile payment services and platforms and has reached exceptionally high levels of financial inclusion. It could be noted that, unlike many other countries, Kenya also has a comprehensive and reasonably functional system to provide unique identification to its population, which is extensively used for know-your-customer (KYC) purposes and citizen-government interactions.

It should also be recognized that as early as 2002 the government had begun to develop an e-governance strategy. The mobile financial services revolution that began in 2007 allowed this strategy to be implemented more intensively, as well as dynamizing the private sector. The combination of Kenya's digital payments platform and its identification system opens the way to leverage digital technology in many ways to better provide a range of services, and opportunities to beneficiaries of public programs, business, and taxpayers and investors.

This paper traces Kenya's digital technology developments. It shows how the combination of mobile phone-based payments and e-money transfers have spurred a vibrant financial market and provided a retail electronic payments system, and how these, in turn, have spurred further innovations. The paper considers how Kenya can strengthen institutional and state capacity to provide public programs and services, as well as the foundation for the private economy, and considers the interest groups and political factors that have encouraged these digital enablers to emerge in ways that are not typical in most countries.

The paper also flags some important challenges that Kenya will need to address in order to further consolidate its success. These include improving connectivity across the country and ensuring a fully interoperable mobile payments platform. Another important focus for the future is to transition to full electronic identification (e-ID)—Kenya's long-established ID system is not the most digitally enabled even though it has wide coverage. Once digitally enabled, it can be further cleaned and its security enhanced.

The paper is organized as follows. The second section shows how Kenya's digital developments have shaped the financial sector and other sectors of the economy. The third section discusses digitization and state capacity. The fourth section looks at the challenges from the market side as well as regulatory challenges that should be resolved to consolidate

the future; it also considers the challenges Kenya faces in transitioning to a fully electronic identity management system. The final section summarizes lessons from Kenya's digitization process. The thrust of the paper is to provide inspiration and guidance for other countries to use Kenya's achievements as an example.

2. The Digital Developments that Make Kenya Unique

This section describes the evolution of mobile phone-based technology in Kenya and its implications for the retail electronic payments system and financial inclusion. These developments have laid the foundation for the digital financial system and provided consumer confidence that has made it easier for the government to ride on the digital platform to develop services and payments platforms that have improved public service delivery.

2.1 The Four Stages of Digitization in the Financial Services Evolution

The four stages of digitization in the financial services evolution in Kenya were facilitated by a “test and learn” approach applied by the Central Bank of Kenya, the Communications Authority and the Competition Authority. This allowed the telecommunication companies to collaborate with the commercial banks to innovate and roll out various financial products and revolutionize the financial system in Kenya. The comfort with ‘test and learn’ approach was that the payments platforms were situated in the commercial banks as Trust Accounts with appointed Trustees approved by the Central Bank. This then had direct regulatory oversight while the e-money was issued by the Telcos under strict regulations, fully backed and held in the Trust Accounts.

In the **first stage** of Kenya’s digital financial services evolution, the mobile phone technological platform was used for electronic money transfers between users. Initially this took the form of person-to-person transfers, with person-to-government and government-to-person transfers and retail payments and settlement coming later. Kenya’s experience indicates that the trajectory of countries such as India, where government-to-people transfers have boosted financial inclusion, is not the only path towards inclusion.

The structure of Kenya’s economy, with its urban and rural divide, was an important driver of success for the money transfer business—“*send money home*” was an easy selling point for M-Pesa. Its success was also driven by an existing network of telco agents selling pre-paid airtime that could be transformed into a point of service (POS) and cash-in/cash-out platform for mobile money. This easily translated into the emergence of an electronic retail payments system, with the trust account in the commercial bank becoming the transactions platform.

The retail electronic payments system has been a game changer; it is the entry point for many Kenyans otherwise excluded from the financial services system. A bank account is not required: Kenyans can participate in the retail electronic payments and settlement system with only their phone number as the account. The system has been described as efficient, effective, transparent, and safe.

In this first stage this ecosystem was composed of a network of agents across the country. It became a source of employment to thousands of Kenyans: currently there are over 180,000 telco agents. It metamorphosed into an agent management network with agents, master agents, and super agents. The agents, supervised by the telecommunication companies, transform cash into electronic units loaded onto SIM cards. Master agents supervise and provide liquidity to the agents. The super agents are banks, micro-finance institutions, or chain supermarkets; they are interoperable across mobile network operators (MNOs). They deal with liquidity distribution and points of service without transactions thresholds, providing an interoperable platform. This “master agent management model,” as it is now referred to in the literature, has developed into a retail electronic payments system supported by a network of agents and integrated with commercial banks, micro financial institutions, and Savings and Credit Cooperatives (SACCOs). The approach helped to drive success and is now being advocated for other countries.

In the **second stage**, the mobile phone-based platform for electronic payments integrated with other commercial banks and evolved into a platform for managing micro-deposits and micro-savings accounts, providing commercial banks with technology to manage micro accounts, build deposits, and drive financial inclusion. As the platform developed, it represented a new definition of digital financial services, but more importantly, it started to impact on the banking intermediation process. Consequently, commercial banks in Kenya accumulated mountains of deposits and expanded their networks across the country and to the East African region.

In 2009, Safaricom launched its bill payment services. Since then, it has partnered with 25 banks and over 700 businesses to facilitate fund deposits; bank transfers; and the regular payment of utility bills, insurance premiums, and loan instalments (Buku and Meredith, 2013). Other MNOs followed with similar products and competitive services. Many businesses now use the online shopping platform to reach customers who make payments through the digital financial platform. Most utility companies have embraced electronic payments, so that many Kenyans pay their utility bills via their mobile phones, and the scope of use continues to widen.¹ Increasingly, mobile can be used for G2P payments, making it easier for the state to provide a range of services and for people to access them—a substantial improvement in state capacity as experienced by citizens.

In the **third stage** of Kenya’s digital financial services evolution, the mobile phone financial services platform developed into a virtual savings account and virtual credit supply platform. The novelty of this stage was the use of transactions and savings data to generate credit scores to be used as the basis to assess credit risks and price short-term micro credit. M-Shwari, a virtual savings platform, launched in November 2012. After 40 months of operations, it had over 15 million customers. Similar products have been launched in Kenya,

¹ In 2019 it was announced that MPesa could be used to pay for goods and services ordered online through AliExpress.com, representing the Chinese giant Alibaba <http://www.mediamaxnetwork.co.ke/511381/kenyans-to-use-m-pesa-on-chinas-alibaba/>

like KCB M-Pesa and Equitel. M-Shwari has also been replicated across the East African region, with M-Pawa in Tanzania and Mokash in Uganda and Rwanda. These virtual banking services and products have attracted over 18 percent of the adult population in Kenya.

The **fourth stage** soon followed, where cross-border payments and international remittances were made possible, in addition to an improved regional payments system.

2.2 Implications for the Retail Payments System

Kenya's retail electronic payments system has become a gateway to financial services and a catalyst in formalizing informal markets. Informal transactions are being formalized and cash transactions are slowly but surely declining. The use of retail payment instruments and the migration to electronic payments cuts across rich and poor households and formal and informal businesses. Electronic payments have reached the underserved and the unserved and have saved costs and time for the government, individuals, and businesses. This has revolutionized tax revenue administration, public finance management and government-to-citizen as well as citizen-to-government payments, as discussed later in section 3. The development of the retail payment system has helped the government design its own payments platforms for better outcomes in public service delivery. It has also helped the government to find new solutions to policy challenges and develop new sources of revenue.

The retail payments infrastructure was one of the earliest beneficiaries of the mobile phone-based payments and transactions platform. Retail electronic payments platforms have reduced transactions costs in terms of time, travel, and even unit costs. Drawing on examples from many countries, the Better Than Cash Alliance has shown that digitization and electronic payments can save countries billions of dollars. The digital platforms being developed across the globe provide great hope that costs of retail transactions will decline drastically once economies migrate to electronic payments instruments and national platforms.

Although there are no hard estimates of the overall degree to which the retail payments system has slashed transactions costs in Kenya, anecdotal evidence suggests that digital financial services—such as ATMs, debit cards, credit cards, and mobile money—have reduced them considerably. Before digitization, direct transaction costs, such as account opening fees and minimum account balance requirements, and indirect costs such as travel time and the opportunity costs of visiting bank branches, were significant barriers to financial inclusion. Through mobile phones, financial services such as account balance enquiry, utility payment, money transfer, and airtime purchase, are now made conveniently without a visit to the bank, the utility service provider, or the MNO agent shop. Schaner (2017) carried out a field experiment in rural Kenya by assigning ATM cards to 1,100 newly opened bank accounts. The study found that the cards reduced withdrawal fees by 50 percent and increased the total number of transactions by over 60 percent in both the short and long run. Schaner points out that most efforts to increase formal financial access have focused on reducing transaction costs, for example via “no frills” accounts, agency banking, or mobile money.

Jack and Suri (2014) show that the safety and certainty of using mobile phone-based (M-Pesa) money transfers has substantially reduced the costs of sending and receiving money. They test the impact of transaction costs on risk sharing by analysing data from a large panel household survey administered in Kenya over a three-year period. They find that the retail payments system dramatically reduced the cost of sending money across families and social networks dispersed over large distances. They point out that the traditional methods of delivering remittances—in person, through friends, or even through bus drivers—was expensive, fraught with delays, and involved substantial losses due to theft. They show that mobile money has had a significant impact on the ability of households to share risk, and this is attributable to the associated reduction in transaction costs. In a further study, Suri and Jack (2016) point out that when M-Pesa was launched, the average distance to the nearest bank was 9.2 kilometres. However, eight years later (in 2015) the average distance to the nearest M-Pesa agent was a mere 1.4 kilometres.

Mobile money has also spurred innovation in the banking system. In February 2017, commercial banks, working through the Kenya Bankers Association, launched PesaLink as a complementary tool to existing mobile money transfer and related wallets. PesaLink, a retail payments switch, enables bank customers to transfer between KSh10 (US\$0.1) and KSh999,999 (US\$9,999.99) in a single transaction. The platform supports transfers through mobile and internet banking, ATMs, branches, and agency banking, in real-time with low-cost charges and without intermediaries. While PesaLink is a work in process, the aim is clearly to help the banking system to compete more effectively with mobile money.

2.3 Innovative Delivery Technologies for Financial Services Have Opened the Frontier of Financial Inclusion

Ten years of data reveal interesting results for the progress of financial inclusion in Kenya. The financial inclusion profile becomes clear when we look at the financial access strands in detail. The access strand classifies users according to their most formal service provider as defined in Table 1.

Table 1. Classification of the financial access strand

Classification	Definition	Institution type
Formal (prudential)	Financial services used through prudentially regulated service providers and are supervised by independent statutory agencies (Central Bank of Kenya (CBK), Capital Market Authority (CMA), Insurance Regulatory Authority (IRA), Retirement Benefit Authority (RBA), and Sacco Societies Regulatory Authority (SASRA))	<ul style="list-style-type: none"> • Commercial banks (includes mobile bank accounts such as, M-Pesa, KCB M-Pesa, MCo-op Cash and M-Shwari) • Microfinance banks • Capital market intermediaries • Insurance service providers • Deposit taking saccos • Foreign Exchange Bureaus and Foreign Exchange remittances
Formal (non-prudential)	Financial services through service providers that are subject to non-prudential oversight by government departments/ministries with focused legislations or statutory agencies.	<ul style="list-style-type: none"> • Mobile financial services (MFSs) • Postbank • National Social Security Fund (NSSF) • National Health Insurance Fund (NHIF)
Formal (registered)	Financial services through providers that are legally registered and/or operate through direct government interventions.	<ul style="list-style-type: none"> • Credit only microfinance institutions (MFIs) • Non-deposit taking SACCOs • Hire purchase companies • Development financial institutions (DFIs) e.g. Agricultural Finance Corporation (AFC)
Informal	Financial services through forms not subject to regulation, but with a relatively well-defined organizational structure.	<ul style="list-style-type: none"> • Groups e.g. ASCAs, <i>chamas</i> & ROSCAs • Shopkeepers/supply chain credit • Employers • Moneylenders/shylocks
Excluded	Individuals who report using financial services only through family, friends, neighbours or keep in secret places.	<ul style="list-style-type: none"> • Social networks and individual arrangements (e.g. secret hiding place)

Source: FSD Kenya and Central Bank of Kenya (2016)

The improvement in Kenya's financial inclusion profile in the last decade show that more and more people have moved away from informal transactions to regulated formal transactions. This has improved the opportunity for independent statutory agencies such as Central Bank of Kenya (CBK), Capital Market Authority (CMA), Insurance Regulatory Authority (IRA), Retirement Benefit Authority (RBA), and Sacco Societies Regulatory Authority (SASRA) to have a better view of the market segments they regulate and improve on their supervision and market development. Using the financial survey data from 2006

(before M-Pesa) to 2009 (soon after M-Pesa was introduced) and three subsequent surveys in 2013, 2016 and 2019, we present Kenya's financial inclusion profile in Table 2.

Table 2. Financial inclusion profile in Kenya 2006–2019 (percentage of the adult population)

Financial Access Category	Total%	Urban%	Rural%	Male%	Female%
2006					
Formal Banking	18.9	32.0	18.9	23.8	14.3
Other Formal	7.5	22.8	8.5	9.2	5.9
Informal	35.2	3.5	39.2	29.5	40.5
Excluded	38.4	41.6	37.4	37.5	39.3
2009					
Formal Banking	21.0	40.3	15.9	25.7	16.7
Other Formal	19.5	22.1	18.7	22.4	18.0
Informal	26.8	16.5	29.5	19.5	33.3
Excluded	32.7	21.1	35.9	32.4	33.0
2013					
Formal Banking	32.4	46.6	24.9	39.1	26.1
Other Formal	34.5	33.4	34.9	32.1	37.3
Informal	7.8	4.3	9.7	4.7	10.7
Excluded	25.3	15.8	30.5	24.1	26.5
2016					
Formal Banking	42.3	59.9	32.1	50.4	34.6
Other Formal	33.0	26.4	36.9	29.3	36.6
Informal	7.2	4.1	9.0	4.1	10.2
Excluded	17.4	9.5	22.0	16.2	18.6
2019					
Formal	82.9	91.2	77.3	86.0	80.0
Informal	6.1	2.8	8.3	11.0	11.0
Excluded	11.0	6.1	14.4	4.0	8.0

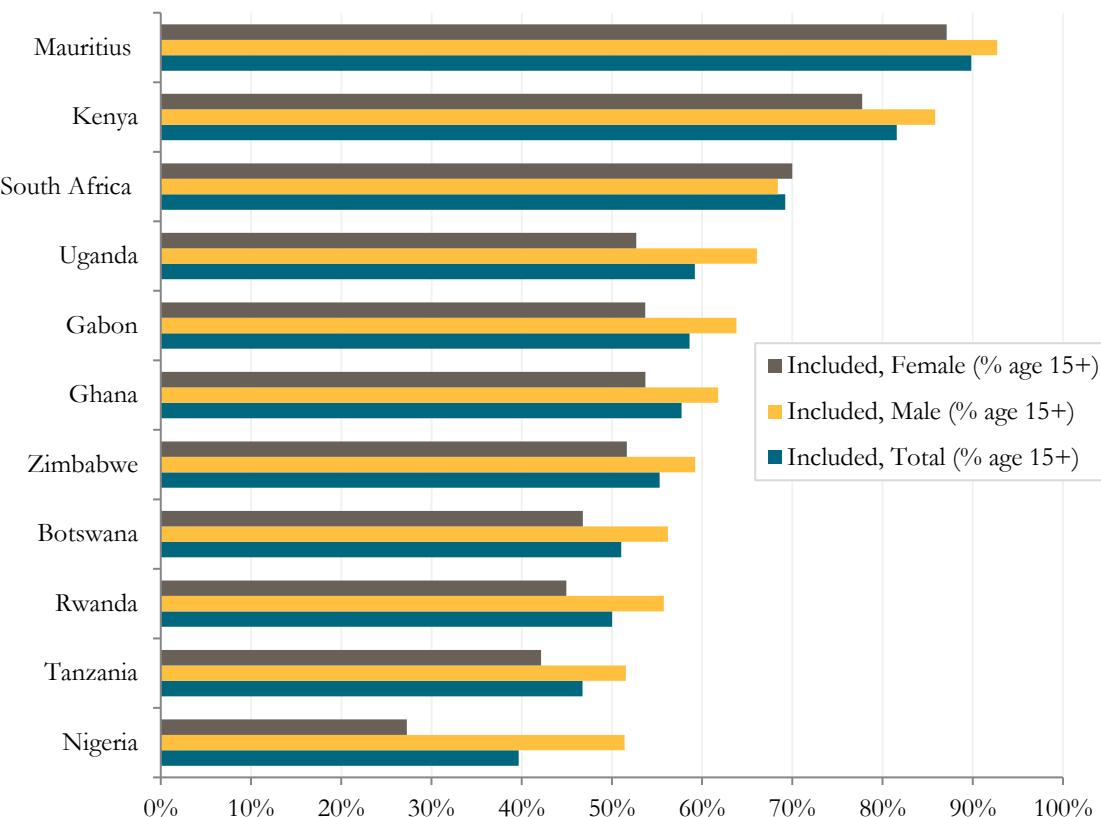
Source: FinAccess Surveys (2006; 2009; 2013; 2016)

As the table shows, the proportion of the adult population included in both formal banking services and other formal financial services increased from 26.4 percent in 2006 to 82.9 percent in 2019, whereas those preferring informal financial services declined sharply, from 35.2 percent in 2006 to only 6.1 percent in 2019. The proportion of the adult population totally excluded from financial services declined from 38.4 percent in 2006 to 11.0 percent in 2019. The proportion of women excluded declined from 39.3 percent in 2006 to 33 percent in 2009, to 18.6 percent in 2016, and further to 8.0 percent in 2019. The acceleration of formal financial access coincides with the introduction of M-Pesa and other innovations that increased access to the financial system between 2009 and 2019.

The male profile of financial inclusion has been even a little stronger. Those excluded have declined from 37.5 percent in 2006, to 24.6 percent in 2013, to 16.2 percent in 2016, and drastically declined further to 4.0 percent in 2019. In terms of the rural-urban divide, the downward trend in financial exclusion has followed the national average, but urbanites have better financial access than their rural counterparts. In 2019, only about 6.1 percent of the urban adult population was financially excluded compared to 14.4 percent of the rural population. The preference for mobile phone-based financial services cuts across rural/urban, gender and age cohorts.

The 2017 Global Findex data confirm these spectacular results on financial inclusion for Kenya compared to other sub-Saharan African countries.² Figure 1 compares Kenya's financial inclusion profile with that of selected Sub-Saharan African countries.

Figure 1. Financial inclusion in selected African countries, 2017



Source: Global Findex 2017 database by Demirguc-Kunt et al. (2018)

Financial inclusion in Kenya reached 82 percent of adults in 2017, substantially higher than for other African countries except Mauritius, a far more developed (and compact) economy.

² The Global Findex database is compiled using nationally representative surveys of more than 150,000 adult aged 15 years and above in over 140 economies (Demirguc-Kunt et al., 2018).

Kenya even outperformed South Africa, which is often seen as a leader in African development. In all countries except South Africa, more male adults than female adults were included, but the gender gap in financial inclusion seems to have narrowed substantially following the mobile financial services revolution. Demirguc-Kunt et al. (2018) point out that progress has been driven by digital payments, government policies, and a new generation of financial services accessed through mobile phones and the internet. They show that 21 percent of adults in sub-Saharan Africa now have a mobile money account—nearly twice the share in 2014 and easily the highest of any region in the world.

We note four important dimensions of financial inclusion and the experiences with digital financial services in African countries:

First, even as financial inclusion has improved dramatically, new products and platforms have emerged, enabled by digital financial services platforms. Virtual savings products and short-term credit platforms have been developed, such as M-Shwari, KCB M-Pesa, and Equitel in Kenya; M-Pawa in Tanzania; and Mokash in Uganda and Rwanda. Table 3 shows the performance of some of these virtual savings and credit products provided by the Commercial Bank of Africa in partnership with Safaricom, Vodacom, and MTN, respectively. The statistics are as reported as at June 2018.

Table 3. Some virtual savings and credit products in East Africa

Product	Date Launched	Number of Customers (As at June 2018)	Total Deposits (\$)	Total Loan Amount Disbursed (\$)	Average Savings (\$)
M-Shwari (Kenya)	November 2012	23,473,384	140,194,300.00	2,771,625,521.00	5.97
M-Pawa (Tanzania)	May 2014	7,394,020	8,036,863.00	56,434,659.00	1.09
MoKash (Uganda)	August 2016	3,665,427	1,480,098.00	19,810,003.00	0.4
MoKash (Rwanda)	February 2017	785,384	513,262.00	4,111,417.00	0.65

Source: Commercial Bank of Africa

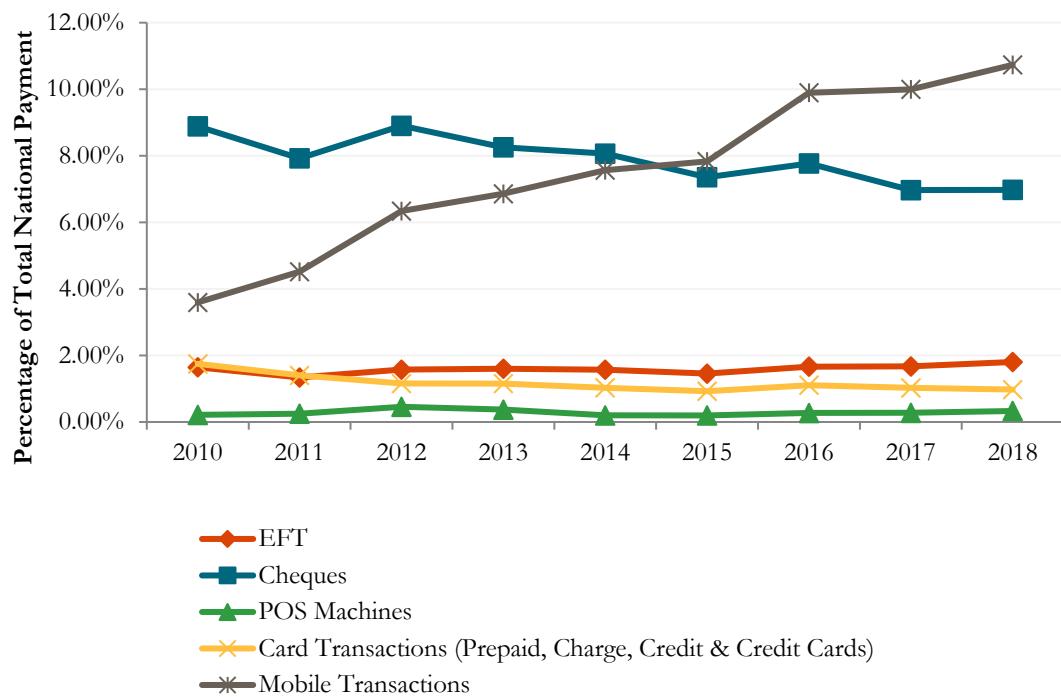
Although Kenya leads the pack in the early adoption of the virtual savings and credit products, over 35.3 million people in the four East African countries had virtual savings and loans accounts by mid-2018. With a client base of over 23.4 million customers, the average savings deposit for Kenya stands at almost \$6. These figures indicate how digital platforms have provided an avenue to increase micro-savings in Kenya and the entire East Africa region. Cumulative lending is a multiple of the level of deposits in all cases.

Second, these developments have encouraged the formulation of more effective and forward-looking monetary policy in Kenya, and indeed the East African region. The fact that the importance of currency outside the banking sector continues to decline and innovations

in the financial system continue to bring more participants into the banking sector is important for calibrating monetary policy to provide appropriate signals.

Figure 2 shows the growth of cashless transactions in Kenya, excluding real-time gross settlement (RTGS) payments that represented, on average, 81.6 percent of all national payments over 2010 – 2018. It shows that the value of mobile-based retail electronic transactions as a proportion of the total national payments has increased from 3.6 percent in 2010 to 10.7 percent in 2018. Checks have declined while other electronic payments such as electronic funds transfer (EFT) have stagnated. Card transactions, too, have declined, from 1.8 percent of national payments in 2010 to 1.0 percent in 2018. These shifts show the effects of growing mobile phone based transactions and the expansion of the retail electronic payments platforms. Most retail outlets in Kenya have adopted cashless payment services, and the government has followed suit through the e-citizen portal, where citizens can access, and make cashless payments for, government services.

Figure 2. Cashless transactions in Kenya



Source: Central Bank of Kenya Online Database (Accessed June 2019)

Third, monitoring transactions and activities in the financial system has become easier with digitization. Kenya has improved its AML/CFT (anti-money laundering/countering the financing of terrorism) regime significantly and has been upgraded from the “dark grey” list by the Financial Action Task Force, suggesting that the power of digitization in improving regulatory and monitoring technology is being recognized by the global community of financial regulators.

Fourth, emerging evidence from studies in Kenya using micro data show that financial inclusion has contributed to sustainable poverty reduction. Suri and Jack, 2016, estimate that some 2 percent of Kenyan households have been lifted out of poverty. Many benefits and potential benefits overlap in the development discourse, and one powerful outcome of financial inclusion and the development of digital financial services platforms has been the empowerment of women. Women can save in platforms and products that cannot be encroached upon, and they are increasingly able to borrow and invest. The World Bank (2014) observes that digital payments can promote women's economic empowerment by facilitating greater account ownership and asset accumulation and increasing women's economic participation. Digital payment, including by governments and employers, facilitates the confidentiality and convenience that women require in financial services and payments. They provide an on-ramp to financial inclusion and, in many cases, the first account that a woman has in her own name and under her own control (World Bank, 2014).

2.4 Digitization and New Product Designs

The digital financial platform has enabled the rollout of products that serve multiple applications, including the delivery of critical services. The use of the digital financial platform to roll out these products and the growth in adoption of the products has enhanced the consumer confidence in the digital financial system and presented an opportunity for FinTechs to roll out payments platforms to support business models across all sectors of the economy. These are sustainable business models because they cover critical sectors of the economy and critical services. We provide a few examples:

One Acre Fund. The One Acre Fund program currently serves farmers in Kenya, Rwanda, Burundi, Tanzania, Uganda, and Malawi. Smallholder farmers require financial products that offer flexibility to accommodate their lumpy seasonal income. One Acre Fund procures high-quality farm inputs (including improved seed and fertilizer), ensures timely distribution of those inputs to a location within walking distance of farmers' homes, trains smallholder farmers on how to use the farm inputs correctly to maximize return on investment, and assists in market facilitation to maximize profits from harvest sales.

In 2014, One Acre Fund rolled out a loan product that offers smallholder farmers flexible repayments with no set schedule. The fund has enabled farmers in Kenya to make loan repayments flexibly over time using M-Pesa, provided they complete repayment by the final deadline. This has increased economic opportunity and financial inclusion in some of the world's poorest farming communities. The results from One Acre Fund (2015) indicate that such an approach can raise productivity, increasing income per acre by 50 percent and generating a dollar impact of roughly US\$135 per farmer.

M-Akiba. In March 2017 M-Akiba was launched in Kenya for micro investment in government securities using the mobile phone transactions platform. The government aims to borrow Kshs 5 billion (approximately US\$50 million) through the M-Akiba bond to fund infrastructural development projects. The M-Akiba bond is also aimed at enhancing Kenya's savings and investment culture, which is low compared to its neighbours; Kenya's savings rate is 11 percent of GDP, compared to 22 percent in Rwanda and Uganda. Kenyans can

invest as little as Kshs 3,000 (US\$30) and will be paid an interest rate of 10 percent per annum every six months.

Digitization thus makes it possible for micro savers and micro investors to participate efficiently in the bond market, previously a preserve for well-established financial institutions and brokerage firms. M-Akiba has opened opportunity for individual small investors in the country who have, over the years, constituted less than 2 percent of the uptake in government bonds. Table 4 shows the uptake of M-Akiba. The KSh 150.04 million (approximately US\$ 1.5 million) uptake of the M-Akiba bond was dominated by small investors who invested less than KSh 10,000 (approximately US\$ 100). Those who invested the minimum amount of KSh 3,000 constituted 31 percent of the total investors whereas those who invested between Ksh 3,001 and KSh 10,000 constituted 34.5 percent.

Table 4. Breakdown of the M-Akiba uptake

Amount Analysis by Band (KSh)	Value (KSh Million)	Number of Investors	Share in Total Number of Investors (percent)
Minimum amount = 3,000	5.31	1,772	31.0
3,001 – 10,000	13.30	1,963	34.5
10,001 – 20,000	9.74	595	10.5
20,001 – 50,000	25.19	677	12.0
50,001 – 100, 000	28.52	366	6.0
Above 100,000	67.98	318	6.0
Total	150.04	5,691	100

Source: National Treasury, Government of Kenya.

Water Vending Machines. An estimated 36 percent of Kenya's total population does not have access to clean drinking water. The problem is particularly acute in arid and semi-arid rural areas and urban slums. In Nairobi's Mathare slums, a public-private partnership between Nairobi Water and Sewerage Company, Safaricom, and Grundfos (a Danish water engineering firm) resulted in the installation of water vending machines. To buy clean water, users load points onto smart cards with credit bought on-site or via their mobile phones, then use the cards to access the water vending machines around the slum. With a simple swipe of the smart card on the vending machine sensor, water is released from storage into a waiting container. Through M-Pesa, payments are collected from customers more efficiently, while a cloud-based system receives and publishes transactional and operational data from each water dispenser, ensuring accountability and reducing service costs.

The introduction of this payments platform appears to have led to a substantial decline in unit costs. Weekly expenditure on water in the slum are reported to have fallen from Sh250 (\$2.5) to Sh2.50 (2.5 cents), a dramatic reduction. Electronic payments have increased efficiency and cut out middlemen. Above all, they have eliminated the market segmentation introduced by cartels.

M-Kopa Solar. M-Kopa is a solar program that supports low-income consumers to acquire high-quality, affordable energy solutions. Customers buy a solar home system on an affordable M-Kopa payment plan, with an initial deposit followed by daily payments through their mobile phones for up to one year. After completing payments, customers own the product outright. As of January 2018, M-Kopa had connected over 600,000 homes to affordable solar power. Estimates from the M-Kopa solar program, show that current customers are likely to make projected savings of about US\$ 450 million over the next four years and enjoy 75 million hours of kerosene-free lighting per month.

M-Tiba. The M-Tiba savings product is a mobile phone-based health wallet that enables users to save money for themselves and others to use at accredited health service providers. M-Tiba uses internationally recognized “SafeCare” standards to monitor the quality of care available at these facilities. M-Tiba’s goal, of deepening healthcare inclusion in Kenya, is aligned to the realization of Sustainable Development Goals. Users are encouraged to save as much as possible so that they can pay for healthcare services in full. Meessen (2018) notes that as early as June 2017 M-Tiba was reported to have registered nearly 900,000 users, providing them access to 450 health facilities, and that the system had processed payments totalling \$1.4 million for 100,000 visits.

These are just a few examples of how digitization has reduced transactions costs, enabling diverse products that are scalable based on demand, and potentially facilitate inclusive growth, economic vibrancy, and higher productivity. Realizing this potential in full, however, will depend on the state’s capacity to regulate the markets and to resolve challenges that emerge from these new developments. We turn to this topic in the following sections when we look at state capacity and the challenges of digital development.

3. Digitization and State Capacity in Kenya

Digitization has played, and continues to play, a critical role in strengthening the relationship between government policies, regulatory institutions, and the desired economic, political, and social outcomes. More importantly, it has become an enabler of market development. It can, however, also be constrained by the capacity of regulatory institutions and regulatory technology. This section discusses the role that digitization has played in strengthening this area and the challenges that exist, or that may emerge, in the digital development process. The next section looks further towards the future.

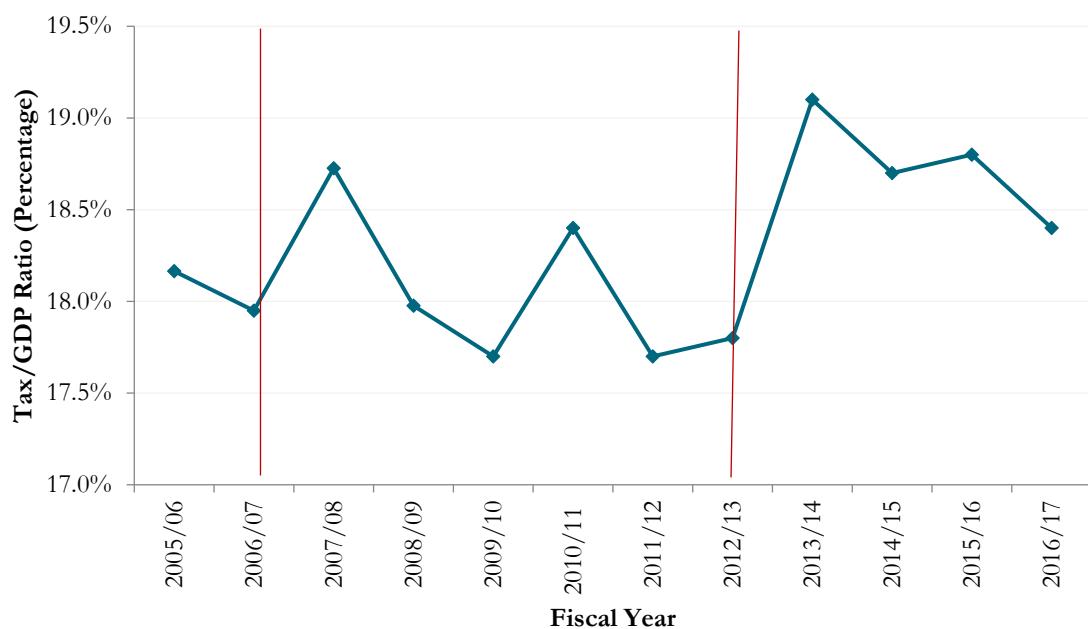
3.1 Fiscal Policy Design: Revenue Administration and Payments for Services

Digitization in Kenya has influenced tax design; it has supported tax payments through efficient payments platforms; lowered the cost of raising tax revenue; and reduced bureaucracy, middlemen, and agents (Ndung'u, 2017b). This has reduced fraud and tax evasion and has improved revenue administration, with huge potential gains for the future.

The main constraints in Kenya's revenue administration have long been leakages and fraud. Digitization is a powerful remedy, since it allows for traceability of payments and revenues. Institutional reforms at the Kenya Revenue Authority (KRA) have strengthened its capacity to cope with technological developments and have the potential to further check corruption stemming from institutional failure. With increased financial inclusion and more taxpayers accessing bank accounts and financial service touch-points, KRA introduced a secure electronic process to expedite the payment of taxes (Ndung'u, 2017b). The payment platforms limit physical interaction between the taxpayer and the tax officer, thus reducing opportunities for fraud. These developments, together with the recent launch of iTax and the introduction of KRA M-service, have enabled a single view of a taxpayer, improved reconciliation, the matching of payment and bank reports online, have allowed for real-time monitoring of revenue collection, and have introduced system checks and audit trails (Ndung'u, 2017b).

The tax re-designs and payment platforms that have followed have been equally successful in riding the wave of digitization. Ndung'u (2017b) show that Kenya's tax base has expanded with the introduction of new tax categories, such as an excise tax on money transfers, VAT withholding, capital gains tax, and rental income tax. For instance, revenue from the excise tax on money transfers, which was introduced in the third quarter of 2013, has more than tripled in three years, moving from KSh 896 million (about US\$ 8.78 million) in 2013Q3 to KSh 3,187 million (about US\$ 31.25 million) in 2016Q2. The trend in Kenya's tax effort from 2005 to 2017 is shown in Figure 3.

Figure 3. Kenya's tax effort



Source: Author's analysis of KRA data

In the figure, the line at FY 2006/07 marks when M-Pesa was introduced. In the same period, KRA started implementing the Integrated Tax Management System for domestic tax administration. The second line, at FY 2012/13, indicates the period KRA rolled out the iTax system. The expanded tax base and ease of tax payment supported by the digital platform has enabled KRA to improve on tax collection from KSh 695.9 billion (about US\$ 6.82 billion) in FY 2011/12 to KSh 911.8 billion (about US\$ 8.94 billion) in 2013/14, and to hit the trillion mark, KSh 1.02 trillion (about US\$ 10 billion) in 2014/15 for the first time. The periods of adoption of digital technologies (2006/07–2007/08 and 2012/13–2013/14) correspond to episodes of sharp increases in tax effort.

Digitization has also revolutionized revenue administration at the national and county levels with the introduction of the Integrated Financial Management Information System (IFMIS), which was first rolled out to national government ministries in 2003 and later to county governments in 2013. The IFMIS is an automated system for public financial management that interlinks planning, budgeting, expenditure management and control, accounting, electronic funds transfers, audit and reporting. It has made the planning and budgeting process in state ministries, departments, and agencies and in counties more efficient.

IFMIS, which has been under constant review since the digital revolution started in Kenya, is supposed to facilitate inbuilt controls and tractable audit trails that clearly follow transactions from their point of initiation to their end. The system, which has an approval hierarchy that ensures segregation of duty and internal checks, has enhanced accountability and transparency in public finance management. It efficiently records revenues collected by KRA and those collected directly by state ministries, departments, and agencies, and by counties, among other sources.

The IFMIS has also led to the automation of recording and reporting for funds disbursed to national and county governments, auto bank reconciliations, and efficient cash flow management. Recently, the government incorporated a fully automated procurement process (e-procurement) into the system, from requisition, tendering, and contract award, to payment, which enhances visibility and accountability at all levels of the procurement process. The Public Procurement Oversight Authority now regularly publishes details of national government tenders online, showing the name of the tender, the ministry concerned, the contract amount, and the winning bidder. This allows for more accountability and transparency in government procurement procedures.

Digital platforms have revolutionized the way payments to and from the government are made. Digital payments have reduced paperwork and ensured direct payments of money from accounts at the Central Bank of Kenya to the intended recipients. The fast, efficient, and transparent processing of payments through IFMIS and the Central Bank G-Pay system, and the use of the eCitizen technological platform, have revolutionized how the government relates to its citizens and provides them services, reducing bureaucracy and improving access. Through the eCitizen platform, Kenyans can apply for government services and pay via mobile money, debit cards, and eCitizen agents.

Digital platforms have facilitated access to and delivery of services in the health and education sectors. In 2009, the National Health Insurance Fund³ (NHIF) partnered with M-Pesa to allow voluntary subscribers to make monthly insurance payments via mobile money. The digital financial system has enabled NHIF to extend health services to informal sector workers with low and irregular income, including by reducing the time spent visiting the NHIF offices to make monthly premium payments. Wasunna and Frydrych (2017) assert that voluntary payment subscribers have grown by over 500 percent since 2009, from less than 440,000 to about 2.3 million in 2017 and that today, the majority of monthly voluntary payments are made via mobile phone. Wasunna and Frydrych (2017) point out that the transition to mobile money has given NHIF better visibility and has reduced leakages while helping the NHIF to facilitate timely payouts to hospitals and other service providers, resulting in more healthcare providers accepting NHIF customers.

The Collaboration on International ICT Policy for East and Southern Africa (CIPESA) (2015) show how the digital platform has also improved services in the education sector. They note that the Ministry of Education's adoption in 2007 of an online system for national primary and secondary school examinations results have made it possible to relay exam results faster and more efficiently. Parents and students can send an SMS with the student's examination index number or simply log onto the Ministry of Education results website, type in the student's credentials, and receive instant feedback (CIPESA, 2015). The system has transformed the examination results dissemination processes and has been adopted by the Kenya Universities and Colleges Central Placement Service (KUCCPS). The KUCCPS, which succeeded the Joint Admissions Board, established a system in 2014 to enable students to apply for college and university admissions online and pay the application fees via mobile phone financial services. Students across the country no longer need to travel to Nairobi to revise their applications or follow up on them, as these services are now available online in the students' portal on the KUCCPS website.

3.2 Transfer Programs and Social Protection

Digital technology has been used to deliver targeted social protection programs in three ways: as embedded in digital identification schemes, in electronic income transfers, or as an alternative means for targeting potential beneficiaries of such programs, primarily through big data (Aker, 2017). In Kenya, targeted social protection programs have been implemented for many years, including both non-contributory and contributory schemes. Safety net programmes aimed at poor and vulnerable groups include cash transfers for orphaned and vulnerable children, older persons, and persons with severe disabilities; urban food subsidies; response to emergency and disaster situations; food distribution; and grants and public works opportunities for youth. The rapid growth in the number of beneficiaries of these

³ National Health Insurance Fund (NHIF) is a government agency that provides health insurance to all formal sector workers (based on compulsory contributions made through employers) and also offers a voluntary payment scheme for informal sector workers.

programs (to over 600,000 households in 2016) has been accompanied by coordination problems, duplication of effort, and parallel implementation structures.

To address these challenges, the Social Protection Secretariat has developed a single registry system for social assistance programs to consolidate information from the many cash transfer programs that are operated independently by different departments and ministries. The system currently includes information from several programs, including the Cash Transfer for Orphans and Vulnerable Children program, the Older Persons Cash Transfer program, and the Persons with Severe Disability Cash Transfer program (all under the Ministry of Labour); the Hunger Safety Net program (under the National Drought Management Authority); and the World Food Programme Cash for Assets Program. The single registry assembles key information from the five programs on registration and enrolment, payments, complaints and grievances, and change management for the beneficiaries. It also includes a link to the Integrated Registration Service to validate the national ID details of cards presented by beneficiaries.

The single registry web portal has improved program monitoring, reduced double registrations, increased transparency and accountability, offered seamless and efficient transfer of data, and enhanced the quality of operations for field officers. Digitalization is thus supporting more effective delivery of the payments, biometric identification of the targeted individuals, and keeping track of payments (Aker, 2017). Interestingly, the programs do not transfer payments into the beneficiaries' mobile money accounts but use custom payments arrangements to allow for the authentication of the final recipients and accountability at the point of payment—something not fully possible with the current national ID system. Social transfer programs have introduced biometric smartcards for two-factor client authentication, and three of these programs use custom payment arrangements effected through agents of Equity Bank and the Commercial Bank of Africa in Kenya (World Bank, 2016b).

The faster, efficient, and transparent processing of payments through IFMIS has also supported direct payments to social protection program beneficiaries. The transmission of funds to the targeted people/areas has been made easier by the digital financial system and the national ID system that has minimized leakages in the latest years. Some earlier programs that were introduced before the technological advances suffered massive failures and benefited those outside the target areas.

Digital technology has also revolutionized the management of pension funds. In Kenya, they can be classified into four clusters: the state-sponsored National Social Security Fund, the civil servant pension scheme, private sector companies' occupational retirement schemes, and individual pension schemes. The Retirement Benefit Authority (RBA), established through the 1997 Retirement Benefits Act, regulates the retirement benefits scheme fund system. The RBA Report of 2017 shows that as of June 2017, retirement benefit assets under management in Kenya stood at Kshs 963.05 billion, an increase of 13.63 percent from Kshs 831.78 billion in June 2016. The schemes continued to invest heavily in government securities with this asset class recording 36.7 percent of the total assets under management (RBA, 2017).

One of the challenges to RBA remains the extension of coverage to the informal sector. In an attempt to cover those in this sector, RBA came up with the Mbao Pension Scheme in 2009. Kenya Commercial Bank is the legal owner of the scheme as the corporate fund trustee. It was developed as an individual pension plan and is now open to all Kenyans above 18 years with national identification documents and a registered mobile phone number. Using their mobile phones accounts, individuals can pay a minimum of Kshs 20 per day, or Kshs 500 per month or Kshs 6,000 per year into the scheme.

In 2017, the government introduced a basic monthly pension income to senior citizens over the age of 70 years. The program's roots go back to 2015, when the National Social Protection Secretariat commissioned a study under an agreement with the World Food Programme (Chirchir, 2018). As part of the study, a pilot of an ICT-enabled registration mechanism using Open Data Kit was undertaken with the existing social protection programmes: the Older Persons Cash Transfer and the Cash Transfer for Orphans and Vulnerable Children. While electronic registration required a substantial upfront investment, Chirchir (2018) argues that it reduced the overall cost by 75 percent compared with a paper-based system. The pilot showed that it would allow data submission in one to five minutes as well as a significant improvement in the quality of data compared to paper-registration.

After the pilot study, the government procured 1,000 tablets and began to register Kenyans 70 years and older for the universal pension using the new technology. In a record three-week period, in July 2017, half a million senior citizens were registered across the country (Chirchir, 2018). In April and May 2018, the registered senior citizens were engaged by the payment providers to ensure that automated identification (KYC) requirements were met and to open accounts through which the funds are channelled. It was necessary to reregister the senior citizens to automate their identification and for the paying commercial banks (Equity and Kenya Commercial Bank) to ensure that they meet the KYC requirements to be included in the program.

Automated identification and digital payments processing can reduce leakages as shown for India by Muralidharan et al. (2016). In their study, the leakage of funds for payments dropped by 2.8 percentage points (47 percent) when the payments were made through biometric smartcards rather than in cash. Muralidharan et al. (2016) argue that biometric technology is especially promising in developing countries, where high illiteracy rates make it unrealistic to universally deploy traditional forms of authentication, such as passwords or PIN numbers. Chirchir (2018) concludes that the key takeaway for Kenya from this program is that technology will work and be efficient if the prerequisite requirements are put in place. These include a strong techno-savvy leadership, staff capacity, well-defined program operational processes, well-tested and customized application software, and a robust and scalable hardware infrastructure.

3.3 Towards Comprehensive e-Government

In 2002, the Kenyan government formed an e-government secretariat to spearhead the use of ICT across government ministries and to automate all government functions. In June 2004, e-government initiatives were launched to facilitate better and more efficient delivery

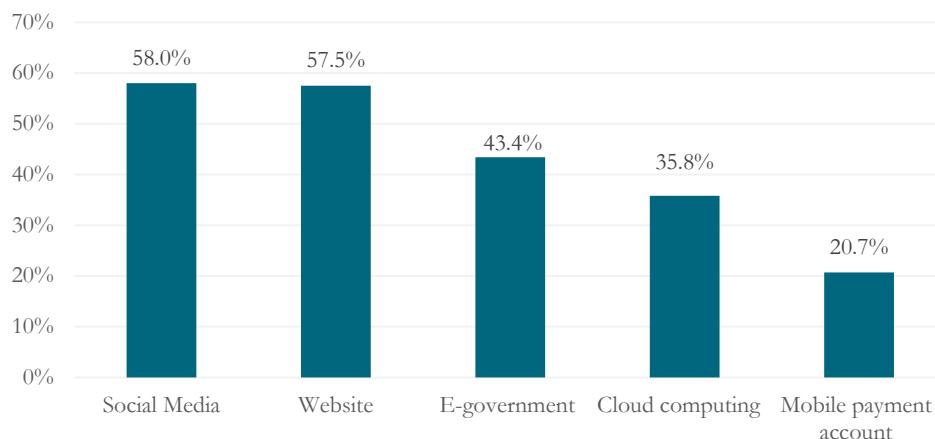
of information and services to citizens and to promote productivity in the public sector, but many remained in limbo until the launch of M-Pesa in 2007, when the digital revolution began to transform how the government provides public services to citizens.

In April 2014, a Government Digital Payments Taskforce was created to implement the centralized electronic government service and payment gateway known as eCitizen—an online portal and mobile application where services could be accessed and paid for using a mobile phone financial services platform. The services offered on the eCitizen platform include business name registration and searches by the Registrar of Companies; the solemnization of marriages, issuance of marriage certificates and commissioning of affidavits by the Registrar of Marriages; driving test booking and renewal/issuance of driving licenses by the National Transport and Safety Authority; provision of land rent clearance certificate and official search for Nairobi blocks by the Ministry of Lands; and applications for passport and Kenya visas by the Department of Immigration. The goal of eCitizen was to cover over 5,000 government services by the year 2020. A quick look at the eCitizen platform shows that at least 42 key government services were being provided through the platform as of August 2018. According to the taskforce, in 2014 alone, citizens, businesses, and visitors to Kenya made over 6,000 daily payments to the central government for different public services (Wasunna and Frydrych, 2017). Only electronic payments are accepted for the services offered through the eCitizen platform.

Alongside the online eCitizen platform, the Kenyan government also established the Huduma Kenya Service Delivery Programme in 2014, a face-to-face service delivery program mandated to roll out physical government service centers in all 47 counties to improve the accessibility of government services. On top of face-to-face service delivery, the Huduma Centres also act as service points for access to eCitizen services. This has helped to enhance the uptake of eCitizen services as the Centres can also help citizens to address queries on the digital services provided by the government.

Despite progress in adopting e-government services, public institutions still face a number of challenges. These include low process automation levels; limited accessibility of public data, information stored in silos and disparate nonstandard formats; siloed provision of government services by government agencies, and limited capacities for counties to roll out e-government services. In 2016, the Kenya National Bureau of Statistics (KNBS) and the Communications Authority of Kenya conducted a survey on the availability of ICT infrastructure and access and use of ICTs in the public sector. The survey sampled 1,030 respondents drawn from ministries and departments within the national and county governments, state corporations, learning institutions, hospitals, constitutional commissions, and independent offices. The survey found that ownership of ICT infrastructure by public institutions was high for computer, internet and local area network (LAN), and telephone, but low for intranet and facsimile. The proportions of public institutions using ICT applications and mobile payment accounts are shown in Figure 4.

Figure 4. Proportion of public institutions using ICT applications and mobile payments



Source: KNBS ICT Survey 2016

The figure shows that 43.4 percent of the public institutions surveyed had implemented the e-government initiatives and that 20.7 percent received payments through the mobile phone financial services. A number of public institutions were found to have an active website, use social media applications, and use cloud computing services, an indication of government using innovation to improve government service delivery (KNBS, 2016). This is a start, but there is a way to go. With the evolution of digitization, the government will need to progress on two critical challenges a lack of focus, and coordination failures.

3.4 Information Access and Public Participation

Just as it is critical for government to have access to information about the society and people that it governs, having access to information held by the government is important to the citizens. Aker (2017) argues that in the provision of public services, digital technology has the potential to increase citizens' access to both public and private information, improve coordination among citizens, facilitate data collection to better allocate public goods, and improve access to financial services, especially through mobile phones. In Kenya, digital financial services have created opportunities beyond financial inclusion.

Digital technology has enhanced public participation in decision making by both the national and county governments. Agencies are increasingly interacting with various interest groups and the larger citizenry in the processes of formulating public policies and regulations. Government ministries, state agencies, and county governments have set up websites through which they share information. The National Treasury has published its financial budgets and other details online since 2007, and the controller of the budget regularly publishes online the corresponding expenditure figures, allowing Kenyans to compare budgeted against expensed financial figures. This enables interested parties to raise queries in a timely way (CIPESA, 2015). The Huduma Centres also act as a one-stop shop for general

government services and information, saving time that would otherwise be spent seeking information from different public offices.

As another example, CIPESA (2015) shows how the crowdsourcing platform *Ushabidi* has been at the heart of civic engagement and social accountability efforts in Kenya. The platform was developed in 2007 by a group of Kenyans and foreign residents to report cases of post-election violence using mobile phone short messaging system (SMS), email, or the web. The information is consolidated and rendered on a map to provide information on emerging violent situations. CIPESA (2015) point out that the *Ushabidi* platform is currently being used to report social challenges in the Kibera slum area in Nairobi and to update water suppliers on gaps in their service or provide crisis information via eyewitness reports of violence through email, SMS or WhatsApp.

Digital technology has also enabled the Independent Electoral and Boundaries Commission to make the electoral process more transparent as compared to the previous period when the voting process was entirely manual. The electoral commission has leveraged the digital platform for biometric registration of voters, SMS confirmation of voter details, and SMS educational alerts on election matters. Currently, voters are identified biometrically, and results are transmitted electronically. This facilitates accurate voter identification and timely transmission of results, thus improving transparency in the electoral process. Election results are also published online on the commission's portal, allowing for further interrogation of the results. Though there are still cases of failures and malpractices, including the challenges of the identification registry, the digital platform has made it easier validate such cases. Future developments will include generating an e-ID that will be more secure and easier to monitor and communicate.

Land is another important area. Manual methods of managing land records have resulted in rampant misplacement of records and deteriorating paper documents that have facilitated fraud in the national land registry, an emotive issue in Kenya. The reorganization of land registries across the country and implementation of an electronic document management system that automates title registration has helped to reduce the time needed to produce titles. One of the key land registries in Nairobi has been fully digitized and can now deliver services online, while the process of digitizing land registries to enhance security of land records and improve service delivery is in progress across the country. The government has also developed a general land rent collection system that allows all land rent information to be accessed through online platforms. This enhances the retrieval of information on amounts owed to the government and shows updated information on payments.

In the area of justice, courts can now electronically manage cases from the filing stage to their final disposition, providing information throughout the process to litigants, advocates, and the public through web-based and mobile phone applications (Mbui, 2014). This has improved information management and retrieval, including through an interactive module for managing timely communications to litigants and advocates about the progress of litigation (Mbui, 2014). The judiciary also introduced *Faini Chap Chap*, a system that allows traffic offenders to pay fines via a mobile money wallet, replacing an older, lengthy, procedure that could take more than two days for a traffic penalty to be paid (Wasunna and

Frydrych, 2017). The National Council for Law Reporting has established the Bench Research Hotline, a research help desk to support the administration of justice by providing judicial officers, especially the judges of the High Court and the Court of Appeal, with dedicated, digitally-enabled, research facilities (Mbui, 2014). The hotline uses an online ticketing system for logging and managing research queries from judicial officers and applies online legal research tools.

3.5 State Capacity and Regulatory Approaches to Oversee Digital Transformation

The innovation that has ignited the digital transformation requires an effective supervisory environment, and one that does not stifle innovation. The digital advance has cut across financial and communication sectors and also touches on the mandates of competition and consumer protection authorities. In Kenya, regulatory issues during the digital transformation have been coordinated by the Central Bank of Kenya in collaboration with the Communication Authority and the Competition Authority of Kenya. This has allowed a coordinated set of policy actions to emerge across regulators over time. The regulator's dilemma, especially for the Central Bank, was how to make sure that innovations lead to better market development and outcomes without compromising the legal framework and guidelines for market conduct.

To do this successfully, regulators need to build their capacity and expertise to understand the digital innovations and, more importantly, to foresee the future and nudge the market towards good future outcome. The FinTech Working Group of the United Nations Secretary-General's Special Advocate for Inclusive Finance for Development (UNSGSA) and Cambridge Centre for Alternative Finance (CCAF) (2019) point out that regulators with limited expertise in technology may find it difficult to understand innovations that FinTech are introducing and assess their implications for regulation. They also note that regulators in emerging and developing economies typically have limited resources, and that technology-led innovation increases pressure on them. According to Ndung'u (2017a) the following goals are important for the regulators when overseeing digital transformation in the financial sector:

- Provide an enabling legal and regulatory environment for the market-driven development of innovative financial services, rather than engage in the design of such services.
- Foster partnerships between telco companies, financial intermediaries and other stakeholders in order to generate endogenous demand for further sector development.
- Adjust regulatory requirements to different stages of development and tailor them according to the risk profile of individual financial services.

- As the digital financial services sector develops, shift regulatory priorities from growth and investment to ensuring interoperability and fostering competition for the sake of greater financial inclusion.
- Explore the role of government as a catalyst for sector development, for example by utilizing e-money system in social protection schemes.
- Ensure close cooperation between relevant regulatory agencies in order to develop a coherent supervisory framework and prevent regulatory arbitrage.

Kenya is often cited as an example of success driven primarily by restrained regulators who preferred to set rules *ex post* as services and their providers evolved rather than impose a strict *ex ante* regime that would later prove inappropriate for the market. This is the celebrated “test and learn” approach followed by the Central Bank from 2007 when M-Pesa was launched. It has taken a combination of innovative telecommunication and banking sectors and a sound regulatory environment to enable the emergence of new financial products for the poor—including many younger users—with potential to improve their welfare. About 67 percent of those using virtual savings and credit products are between 18 and 34 years old. A similar pattern is emerging in Tanzania, which is following Kenya’s trend towards a digital economy albeit with a different market structure.

The Kenyan example seems to demonstrate that progress in financial inclusion requires improvements in the regulatory environment. This includes regulatory reforms, as well as leveraging successful cases to make the financial market more accessible, efficient, safe, and reliable, to boost confidence and endogenously move financial inclusion to the next level. A poor regulatory environment can impede innovation and will constrain the speed of financial inclusion. In this regard, we outline the role that regulation has played in creating a good environment in Kenya and why we consider regulatory capacity as critical for success.

First, regulatory changes are needed to enable successful adoption and adaptation of innovations. In the case of Kenya’s digital financial services, telecommunication regulators, bank regulators, and even competition regulators have encouraged adoption and use by steering a favourable environment for new products and enhancing their credibility.

Second, the regulatory environment and regulatory technology in the financial sector has increased financial inclusion in a manner that is also compatible with the traditional mandates of financial regulation and supervision, namely enhanced financial stability and integrity. In addition, the technological platform has improved the management and monitoring of transactions. Commercial banks and microfinance institutions have built their capacity using this platform. This creates an endogenous self-benefiting cycle of reinforcement from regulations to positive market outcomes.

Finally, by bringing the financially excluded into the banking system, regulation has enhanced consumer protection and created a better environment for monitoring the AML/CFT regime. It has also created a better environment for monetary policy, reducing the use of cash across the economy. The innovations in the financial sector have led to

continuous evolution of regulation and supervision to keep pace with the innovations in the market place.

The Test and Learn Approach

Digital transformation in the financial sector in Kenya followed the four stages discussed in Section 2.1, facilitated by the “test and learn” regulatory approach. The launch of M-Pesa as a payments and money transfer platform was developed jointly by Safaricom, a telco company, and the Commercial Bank of Africa. Prior to M-Pesa, mobile phone customers had engaged in trading pre-paid airtime (Ndung'u, 2017a). M-Pesa thus built on a pre-existing understanding of value transfer via mobile phone among Kenyans that provided an enabling environment for rapid adoption by both agents and customers. Ndung'u (2017a) explains that the launch of M-Pesa was facilitated by the pre-existing legal framework. This included the Central Bank of Kenya (CBK) Act of 2003 that authorizes the Bank to supervise the national payments infrastructure and the 2006 Communications Law which recognized electronic units of money, thus providing the legal foundation for telco companies to store monetary value in SIM cards. However, the national payments and settlement bill was yet to be passed into law. In response, the CBK, provided two forward-looking actions. First, a team of legal experts from the Central Bank developed a Trust Account, invoking the Trust Law. This allowed the M-Pesa product to take off and the trust account became the technological transactions platform. Second, in order to provide a cushion and create confidence in the market, the National Payments System draft guidelines were developed to supervise the market (Ndung'u, 2017a).

Ndung'u (2017a) points out that the supervisory authorities operated the payments platform as a trust account at the commercial bank, subject to regulation by the CBK and the stipulations of the Trust Law. Once the electronic money was stored in the SIM card, it was simultaneously loaded into the trust account at the Commercial Bank of Africa, which was in the custody of trustees. In other words, the trust account was not a Safaricom business account. Safaricom only played the role of a transmission backbone; it could not access the funds and the Trust account was not, and is still not, part of Safaricom's balance sheet. In the case of a Safaricom bankruptcy, the funds would still be protected from Safaricom creditors. The use of a trust account connects the payments system platform to a commercial bank, thus separating regulatory issues and providing the market with confidence (Ndung'u, 2017a).

In the second stage of digital financial transformation, M-Pesa evolved from using a common trust account for all users to providing a connection with individual savings accounts. In line with his perspective, the CBK issued regulations that would allow M-Pesa to connect with individual savings accounts at commercial banks (Ndung'u, 2017a). This move initially encountered resistance from the leading Kenyan banks, especially those who had developed technology to manage micro deposit and savings accounts. They were concerned about a potential exodus en-masse from micro account holders to M-Pesa. The CBK assured the banks that integrating with M-Pesa was to their benefit: customers would not need to visit a branch to withdraw and deposit money, thus enabling banks to reduce personnel cost, and they could earn ledger fees independent of office hours. Indeed, the

subsequent growth in bank customers using M-Pesa proved to be beneficial both for banks and for financial inclusion policy outcomes.

In the third stage of the digital transformation, the use of mobile financial services allowed banks and telco companies to gather transactions and savings data from customers. This in turn allowed financial intermediaries to evaluate customer behavior in order to generate individual credit scores and customize the pricing of credit; this emerged as the central platform for digital credit assessment and the distribution of micro-credit (Ndung'u, 2017a). In cooperation with the Communications Commission of Kenya, now Communication Authority (CA), Ndung'u (2017a) explains that the CBK issued a series of guidelines designed to mitigate financial risks. This included measures to address liquidity risk, that is the risk that a counterparty would not settle an obligation for full value when due. This was mitigated by ensuring that Safaricom employed stringent vetting criteria for counterparties based on their financial soundness. Steps were taken to mitigate operational risk, which includes hardware or software problems, human error, or malicious attack that would cause the system to break down or malfunction giving rise to financial exposures and possible losses (Ndung'u (2017a). In authorizing the M-Pesa service, and bearing in mind settlement risks, the CBK placed maximum limits on transaction. Later, these limits were gradually revised upwards as confidence increased and the payments platform was diversified to other banks.

In the fourth stage of the digital transformation, M-Pesa expanded from domestic money transfer into cross-border remittance services. This development is especially beneficial for customers that rely on international remittances and carries important implications for financial sector formality and adherence to anti-money laundering and terrorist financing (AML/CFT) standards (Ndung'u, 2017a). In 2011 the Financial Action Task Force placed Kenya in the “dark grey” list of countries with inadequate AML/CFT regulation. At a Financial Action Task Force (FATF) Plenary in Paris, the CBK Governor spoke out in defence of Kenya’s financial system. The Governor argued that the M-Pesa platform had enabled informal transactions to transition to formality and that they would be easy to monitor. From the Governor’s perspective, informality was the greatest danger for the AML/CFT regime in Kenya and M-Pesa was fighting this. The point was appreciated by the Plenary; it resonated with recent moves by the FATF to advance the financial inclusion agenda in order to improve AML/CFT compliance. From the outset and even before authorization, Safaricom was advised on these requirements.

This regulatory approach by Kenya has been replicated elsewhere. For instance, in Tanzania, the regulator made a progressive decision: to let regulation follow innovation and support financial inclusion while managing risks. Castri and Gidvani (2014) point out that by engaging closely with MNOs (and their respective partner banks), the Bank of Tanzania (BOT) has been able to offer the private sector a degree of freedom in rolling out new products, responding with sufficient safeguards where necessary. By 2010, Castri and Gidvani (2014) show that the market had reached a certain level of maturity, with four providers and more than 10 million registered mobile money customers. The BOT had progressively increased its operational knowledge of mobile money and was now in a position to draft regulations that would provide more legal certainty to providers. The BOT

also had to ensure that the regulatory arrangements were in compliance with supporting laws and regulations, such as the AML/CFT regime. As the mobile financial services market evolved, continued emphasis on the “test and learn” approach needed continuous revision to shift to other regulatory approaches such as innovation offices, regulatory sandboxes and RegTech. These interesting examples require a brief exposition:

Innovation Offices

Innovation offices are functional units that play a key role in facilitating regulator–innovator engagement. UNSGSA FinTech Working Group and CCAF (2019) point out that innovation offices engage with, and provide regulatory clarification to, financial services providers that seek to offer innovative products and services. They can improve understanding of technology-enabled financial innovation and support appropriate regulatory responses. They may reduce regulatory uncertainty and signal a pro-innovation stance, which, in turn, encourages inclusive FinTech. UNSGSA FinTech Working Group and CCAF (2019) note that for the innovation offices to be effective, there should be early and close, engagement with innovators, the executive buy-in and inter-agency coordination.

Regulatory Sandboxes

A regulatory sandbox is an approach, typically expressed in writing and published, that allows live, time-bound testing of innovations under regulatory oversight. It consists of a set of rules that allows innovators to test their products/business models in live environment without following some or all legal requirements, subject to predefined restrictions. UNSGSA FinTech Working Group and CCAF (2019) explain that to date, at least two discernible models have emerged: (i) product testing sandboxes and (ii) policy testing sandboxes. The lines between the two are not rigid. As pointed out by UNSGSA FinTech Working Group and CCAF (2019) there is emerging evidence of policy testing within product-focused sandboxes, particularly in the context of thematic cohorts. Sandboxes can help regulators gain a better understanding of FinTech and develop evidence-based regulations that promote inclusive FinTech. A regulatory sandbox brings the cost of innovation down, reduces barriers to entry, and allows regulators to collect important insights before deciding if further regulatory action is necessary.

RegTech

RegTech (regulatory technology) is a distinct innovative regulatory initiative. UNSGSA FinTech Working Group and CCAF (2019) point out that RegTech focuses on how to monitor and enforce compliance with relevant regulations thus can support a more responsible delivery of innovative financial services, which may directly impact financial inclusion. It also allows regulators to swiftly respond to market developments, better protect consumers, and enhance institutional supervision. UNSGSA FinTech Working Group and CCAF (2019) argue that in the recent past, regulators have begun to consider RegTech as a tool to help keep up with the rapid changes in the marketplace for financial services, with RegTech being considered as two distinct but complementary branches, that is, compliance technology (CompTech) and supervisory technology (SupTech).

In Kenya, the digital platform has enhanced the capacity of financial regulators to monitor and evaluate the sector, and ensure compliance. In 2009 a Financial Sector Regulators Forum was established to foster cooperation, share information, and enhance policy coordination among financial regulators including the Central Bank of Kenya, the Capital Market Authority, the Retirement Benefits Authority, the Insurance Regulatory Authority, and the Sacco Societies Regulatory Authority. The forum leverages the digital platform to share data and information, which is compiled and published biannually in the Financial Sector Stability Report. The report, which is publicly available, analyses developments in, and the performance of, Kenya's economy and financial sector. The currently observed success story of M-Pesa is that it has a FinTech characteristics, it is a FinTech product, and above all it is described as one of the most successful Regulatory Sandbox in the world. It is a case in point to show that regulators can be agents of market development and for that function to work regulatory capacity is required. The capacity of the Central Bank of Kenya at the time, together with other regulators, allowed innovations to take place and to guide the process without stifling it. This requires effort, regulatory capacity and above all regulatory capability.

4. The Challenges of Digital Development: Consolidating the Future of Digitization in Kenya

Even as it can help to strengthen government capacity, digitization raises new demands on that capacity for effective regulation. To reap the full range of potential benefits, Kenya will need to ensure a competitive ecosystem and infrastructure that facilitates entry. An enabling regulatory environment and robust consumer protections will also be critical. This section explores the main challenges facing the future digital environment.

4.1 Securing Interoperability of Retail Electronic Payments and Transparent Pricing

The interoperability⁴ of mobile network operators (MNOs) and transparency in the costing of services are still concerns for telecommunication regulators and financial institutions. Kenya's National Payment System Act of 2011 requires payment service providers to use systems capable of becoming interoperable with other payment systems in the country and internationally. However, there are large imbalances in the shares of a mobile market that has almost reached saturation coverage. As of September 2017, the number of mobile subscriptions stood at 41 million corresponding to a mobile penetration rate of 90.4 percent. Safaricom is the dominant MNO in Kenya with a market share of 71.9 percent, followed by Airtel with a market share of 14.9 percent and Telkom Kenya (previously Orange Kenya) with a market share of 8.4 percent. The fact that Safaricom continues to dominate the

⁴ Interoperability can broadly be described as the interconnection of mobile money services either between providers or with external parties (Mazer and Rowan, 2016).

market creates a fundamental conflict of interest since all other financial institutions in Kenya remain customers of, and competitors to, one dominant MNO.

The conflict of interest derives from the fact that Safaricom controls access to a large proportion of the mobile network and has an incentive to restrict access to competitors. Mazer and Rowan (2016) point out that the presence of a dominant MNO leaves third-party providers with no other option to reach the majority of the market than to go through this MNO. This implies little incentive for the MNO to drive down the price of unstructured supplementary service data (USSD) technology, which is the dominant front-end technology used in the deployment of mobile banking services in Kenya. The dominant MNO has considerable power to set prices in the market and to control competition by providing or restricting access. Without interoperability, consumer freedom to switch to other networks is limited; accounts are effectively restricted to those on the same MNO network, agents are not likely to function as agents for multiple MFS providers, and access to MFS channels by third parties is restricted (Mazer and Rowan, 2016). Especially in a near-saturated market, there will be less willingness on the part of Safaricom, as the dominant MNO, to extend interoperability since it may have more to gain by protecting its share of the pie rather than expanding the size of it. Paradoxically, the concentration in market share across mobile financial service provider may also create less demand for interoperability from consumers, since most of their peers will use the same provider.

However, these concerns—real as they are—seem to oversimplify the debate on interoperability in Kenya. It appears that most researchers considering this issue ignore four important elements of the market structure that developed soon after M-Pesa's success.

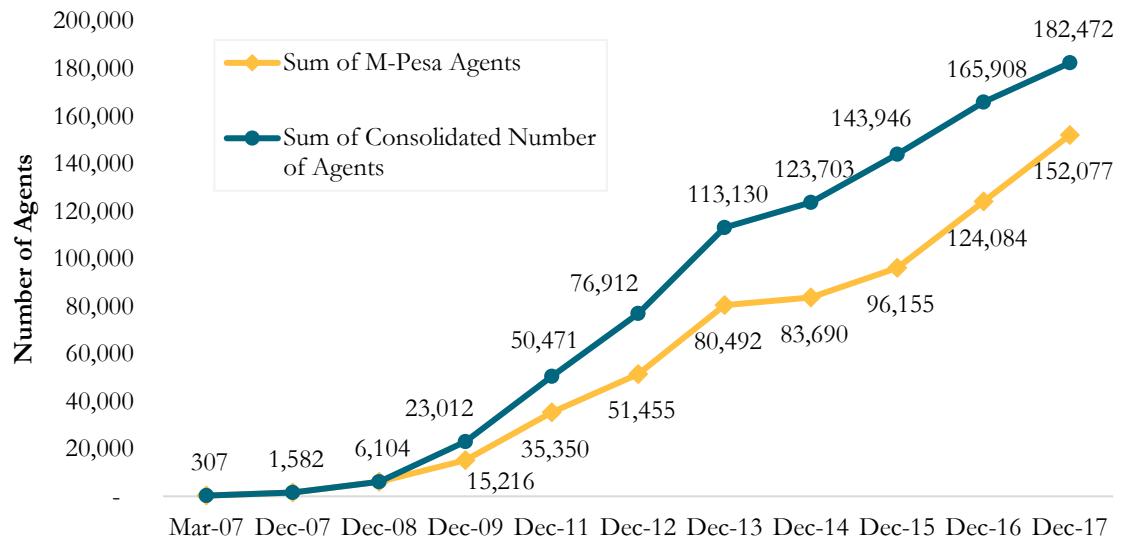
First, Safaricom has built a network infrastructure for connectivity that is larger than any other MNO and which it would be very expensive for other MNOs to replicate. A viable solution could be a market arrangement for leasing\renting the installed telcom infrastructure by Safaricom to other MNOs and MVNOs in a given locality based on utilization, as an important avenue for increasing competition and moving interoperability to a higher level.

Second, the agent management model has been structured around Safaricom activities. The regulators imposed supervisory responsibility on Safaricom for its agents, and the resulting master agents model, described previously, is largely responsible for M-Pesa's success. Even when the agents' exclusivity clause was removed, other MNOs did not move to engage with the existing agent network, which could have created fertile grounds for competition and demands for interoperability. Instead, they have continued with their relatively small number of agents.

Figure 5 shows the growth in the number of mobile financial services agents in Kenya since May 2007. It shows that M-Pesa agents have dominated the mobile financial services agents' network throughout the period. As of December 2017, out of 182,472 agents in the network, M-Pesa (Safaricom) agents stood at 152,077 (or 83.3 percent) across the country, whereas the combined agents for all the other MNOs and MVNOs (mobile virtual network operators) were 30,395 (or only 16.7 percent, even less than their combined market share).

The argument here is that interoperability is supposed to increase the market size, lower unit costs and enhance competition as well as efficiency, leaving market shares to depend on the products and services rolled out by the different MNOs.

Figure 5. Mobile financial services agents in Kenya



Source: Author's analysis of Central Bank data

Third, it is much easier for businesses and financial institutions to integrate with M-Pesa as a payments platform. This is in part due to M-Pesa capturing the first-mover advantage, but it also reflects M-Pesa's continued heavy investments in infrastructure, both connectivity and payments platforms, which other MNOs have not been able to replicate. For the debate on interoperability to move to the next level, the market structure in Kenya need to be appreciated. This is why progress probably implies developing arrangements for Safaricom to lease or rent out its existing infrastructure to other MNOs and MVNOs.

Safaricom also leads in another important dimension. It has rolled out a range of complementary products that other MNOs have failed to develop, including support for internet connectivity and CCTV security networks, even for the use of the government. The lack of product diversity by other MNOs and MVNOs has restricted their coverage and reach. Getting to a competitive market will not be a simple process.

4.2 Connectivity across the Country

According to the World Bank (2016), there are some 4 billion people worldwide without internet access, about 2 billion who do not use mobile phones, and almost half a billion who live outside areas with a mobile signal. Currently, the majority of mobile users in Kenya are on 2G technologies, with many on 3G technologies and only a few on 4G technologies. According to Sanni (2017), as of 2016, while Kenya's mobile subscribers market penetration

was at 54 percent its proportion of 3G connections was far lower at 22 percent while its proportion of 4G connections was only 2 percent.⁵

The GSMA's Mobile Connectivity Index measures individual countries' mobile internet penetration based on four key enablers for mobile internet adoption: infrastructure, affordability, consumer readiness, and content. Sanni (2017) argues that to enable greater connectivity, Kenya needs to address a number of these enablers, particularly around network quality, affordability for low-income users, digital skills, and the creation of content in more local languages. If not adequately addressed, the exclusion resulting from these connectivity challenges is likely to further widen the digital divide in Kenya, which is a great concern to the adoption and uptake of e-government services. Power is another constraint: connection to the national electricity grid is limited, especially in rural areas, and there are frequent power blackouts across the country, including for Huduma centers.

Recognizing the gap, the Kenyan government has made efforts to improve connectivity nationwide. As at June 2016, the government had laid 6,000 Km of national fibre optic backbone across all 47 counties. The installation of internet connectivity equipment has been completed in 29 counties. Installation works were in progress in 12 other counties while five counties were awaiting approval of design. The government intends to engage private sector players to conclude the installation of the national fibre optic backbone infrastructure. There are also proposals for a project to develop constituency digital innovation hubs to support entrepreneurs, including access to free Wi-Fi, in all 290 constituencies. Improved connectivity across the country would further reduce the cost of doing business, bridge the digital divide, and enhance the roll-out and use of innovative products on digital platforms.

4.3 Regulatory Challenges

Several regulatory challenges have arisen from the growth of digital platforms in general and digital financial services in particular. First, preventing cybercrime remains a challenge for Kenyan regulators, especially in terms of capacity for adequate office-level surveillance. A 2016 cybercrime and cybersecurity study by Symantec ranked Kenya as the prime source state in sub-Saharan Africa as measured by cyber-attack numbers, malware, spam, and phishing hosts (Didenko, 2017). Kenya lacks a comprehensive legal framework for addressing cybercrime. Legislative reforms are underway following the publication of the Computer and Cybercrimes Bill in June 2017.

The second challenge—as noted above—is the market dominance of a single MNO—Safaricom. In 2014, the Communications Authority of Kenya ordered Safaricom to open its network. This was followed by plans to ensure full interoperability of mobile money networks in 2017 and even proposals to separate the mobile money business (M-Pesa) from

⁵ Most of these indicators compare favourably with sub-Saharan Africa's averages: 43 percent for mobile subscribers' market penetration, 26 percent for mobile internet subscriber penetration, 31 percent for proportion of 3G connections, and 2 percent for proportion of 4G connections.

the controlling operator (Didenko 2017). However, the implementation of initiatives designed to ensure interoperability and fair competition remains a challenge. The constraints are generated not simply by market dominance or monopoly *per se*, but by the market structure that has developed following M-Pesa's success. This means that—as previously explained—several regulators would need to come together and make proposals for the leasing or sharing of digital infrastructure to effect interoperable platforms. In May 2018, interoperable transactions were formally launched. So far, these cross-network transactions are not in real-time like those of M-Pesa, and their unit cost is much higher. However, these challenges can be overcome. If all MNOs and MVNOs invest in real-time transaction platforms, the unit costs will decline.

The third challenge is the lack of specific crowdfunding regulations in Kenya or in generating new regulations to cope with such innovations and new business designs. A number of regulators have authority to regulate various forms of crowdfunding, including the Central Bank of Kenya, the Capital Markets Authority, and the Communications Authority of Kenya (Didenko, 2017). A recent study by the Cambridge Centre for Alternative Finance identified several statutes and regulations that might apply to the operation of crowdfunding platforms, depending on their mode of operation. These include the National Payment Systems Act, the Money Remittance Regulations, the Kenya Information and Communications Regulations, the Microfinance Act, the Proceeds of Crime and Anti-Money Laundering Act, the Capital Markets Act, the Banking Act, and the Public Offer Regulations (Didenko, 2017). The Public Fundraising Appeals Bill proposes additional licensing requirements in connection with fundraising systems.

The fourth challenge is the expansion of the M-Pesa technological platform to enable cross-border payments and international remittances. The immediate benefit of this development would be the transformation of Kenya's informal Hawala money transfer system to a formal money remittance system. Demand for regulations to cope with these innovations, and the more intensive use of technology to monitor the money-transfer market, have improved the AML/CFT regime. However, the expansion of commercial bank branch networks in the East Africa region and the expansion of the M-Pesa platform to enable cross-border and international remittances, pose an increasing challenge for regulators. Mwega (2014) points out that financial integration implies that the negative externality costs associated with bank failure go beyond national borders, a reality that is not taken into account by national regulators and supervisors. The emergence of virtual currencies, such as Bitcoin, pose a further challenge to the central banks charged with monitoring and supervising international transactions, in areas where demand and supply mechanisms are not yet clear.

4.4 Market Protection and Consumer Protection

In 2006, the government made it easier for M-Pesa-type products to enter the market by amending the communication law to recognize electronic units of money. Under the new law, the Central Bank advised that telco agents would only need to transform cash into electronic units of cash rather than use pre-paid airtime as a mode of payment, as was practised and envisaged at the time. Further, the Central Bank advised that once this step

was complete, trust accounts could be created in commercial banks to host the electronic units of money, thus becoming the transaction accounts, or platform, in the absence of a national payments and settlement law.

From the outset, the Central Bank argued that M-Pesa was a bank product that was unique in being a partnership between a telco and a commercial bank. The telco (Safaricom) provided the transmission function via mobile phones. As noted previously, the funds would be held in a trust account that worked as a pay-in and pay-out platform, and the only concern would be residual balances in the individual micro-accounts. The trust account was not a Safaricom business account; Safaricom could not access the funds and they did not appear on Safaricom's balance sheet. If Safaricom were to go bankrupt, the funds would remain safe from creditors.

Trust accounts thus became the payments system platform in a commercial bank, separating regulatory issues for banks and telecommunication companies and providing the market with confidence. In addition, the trust account as payments platform allowed layers of insurance that would protect the platform to be developed. Guidelines for telco agents were agreed between the Communication Commission of Kenya, telco regulators, and the Central Bank of Kenya. This became the Master Agent model. The Central Bank monitored the average residual balance in the trust account whereas Safaricom supervised and regulated its agents.

The National Payment Systems Act was formally established into law in 2011. The Central Bank of Kenya and the MNOs understand that the regulatory structure of the industry would be amended from time to time to respond to dynamics in the market and mitigate any ensuing risks. Prior to the enactment of Consumer Protection Act in December 2012, Kenya did not have a specific law governing consumer protection. The act provided a timely introduction to consumer protection, but it did not provide protection for financial products and services (Malala, 2013). Existing payment laws have not adequately protected consumers since they do not apply to all types of non-cash payments. Moreover, the Banking Act gives the Central Bank authority to regulate banking activities but does not define its consumer protection mandate beyond regulation and supervision in the interest of consumers. However, Malala (2013) points out that the Central Bank's National Payment System Department has overseen the integrity of information technology and service delivery systems protecting mobile payment customers from operational failures. Additionally, the Communications Authority of Kenya issued the Kenya Information and Communications Consumer Protection Regulations in 2010 outlining the rights and responsibilities of consumers and setting out specific provisions that define the obligations of service providers related to complaint handling, information disclosure, billing practices, data privacy, and other issues.

Disclosure of the terms and conditions of credit provided by the financial institutions is also subject to regulation but, for digital credit, adherence to these regulations is still a challenge. A review of digital credit products offered in Kenya by Mazer and Kate (2017) reveals gaps in disclosure and client communications. This includes failure to clearly state the actual finance charges the consumer will pay; the use and application of monthly or weekly interest

rate figures instead of a standardized calculation such as annual percentage rate (APR); inconsistent disclosure of finance charges across lenders; and nondisclosure of costs (and benefits) of other products that may be bundled with the digital loan. They also note that terms and conditions for digital credit are offered only via a weblink that cannot be viewed directly through the channel the consumer uses to borrow. The disclosure of data handling practices is also unclear; providers do not clearly communicate the types of personal information or data they are collecting from consumers, how they or their partners are using these data to make digital credit offers, and whether consumers are able to access, correct, and restrict the sharing of their data (Mazer and Kate, 2017).

4.5 Towards Full Electronic Identity (e-ID)

The Kenyan identification system can be traced back to 1920. As shown in World Bank (2016b), the system's main components are the Department of Civil Registration, which registers births and deaths and issues the appropriate paper certificates; the Department of Immigration Services, which provides visas and residence permits to aliens and passports to citizens; the Department of Refugee Affairs, which works with UNHCR and provides work permits to qualified refugees; and the National Registration Bureau, which registers citizens at the age of 18 and issues national ID cards and numbers to applicants who meet the criteria for citizenship.

Kenya has leveraged digital technology in the management of a comprehensive database of all registered persons and provision of related services. The National Registration Bureau collects biographic and biometric data through its application process and operates the systemwide Automated Fingerprint Identification System, which checks against possible duplicate or multiple registrations (World Bank, 2016b). In March 2015, the Integrated Population Registration System was launched to provide an integrated identity service that enables authorized public and private entities to conduct a validation check on identity documents issued by government agencies. World Bank (2016b) shows that the Integrated Population Registration System responds to around 1.5 million electronically generated identity-related queries per day.

The Kenyan government is planning to replace the current “second generation” national ID cards with a new ID system including a machine-readable card with a microchip that will contain more comprehensive details of the holder. This new card will make it easier to transmit transaction and other data in real time. The government is in the process of implementing a six-character Unique Personal Identifier that will be linked to an electronic database with the educational records of all individuals from primary school up to university level.

Bringing the citizens onto the mobile phone-based digital platform involves registration of SIM cards. Initially, SIM card registration was not required, but when M-Pesa and similar products entered the market, the Central Bank decided that participants in the mobile phone-based payments ecosystem should have their SIM card registered. The Kenya Communications Act was amended to regulate SIM card registrations. Before a telecommunications operator sells a SIM card or otherwise provides telecommunication

services to a person, it shall obtain the person's full name, identity card number, date of birth, gender, and physical and postal address. The law requires that telecommunication operators ensure that proper physical or electronic records are kept of the subscribers' information. It also allows telecommunications operators to disclose the registration particulars of a subscriber in connection with the investigation of any criminal offence or for the purpose of any criminal proceedings. It is thus possible to trace retail electronic payment transactions to the holder of the mobile phone and to check on fraud when it happens.

However, Kenya's current registration/identification system has several limitations (World Bank 2016b). First, the system's components have traditionally functioned in silos, without a single authority mandated to provide identification services across the population. This has resulted in considerable duplication of registration facilities as well as disjointed data from the various agencies.

Second, there is limited civil registration coverage with estimated rates of birth and death registration low, at 63 percent and 45 percent respectively. This limited coverage cannot provide a solid foundation for the national registration system.

Third, the system has over-relied on manual processes and only recently started to transition to digital databases and processes. The heavy reliance on manual processes, as well as weak birth and death registration and an ID number without check digits, increases the potential for error and possible ID fraud (World Bank, 2016b).

Fourth, the biometric data collected in the process of registration is not readily accessible to help authenticate individuals against their ID credentials. As a result, several programs have developed, or are developing, independent biometric systems for this purpose, raising the prospect of costly incompatible systems (World Bank, 2016b).

Fifth, Kenya has a weak legal framework around data privacy. The 2012 Data Protection Bill is still under consideration.

It is important that Kenya address these issues as it looks towards a robust, inclusive and privacy-supporting e-ID system able to provide identification services for an increasingly digitized society.

5. Lessons from Kenya and the Future of Digitization

We have shown how frontier developments and endogenous innovations shaped the Kenyan market through a unique "test and learn" process adopted by regulators. What started as a bank and telco product (M-Pesa) on a simple money transfer technological platform has pushed innovation space and the regulatory space towards important digitization developments. Digital development in Kenya has contributed towards strengthening state capacity in important ways. At the same time, these impressive achievements have also raised concerns about the need to further strengthen state capacity to cope with regulatory challenges, provide market safeguards, and evolve a national identification system that is suitable for the next phase of an increasingly digital society.

What lessons can be drawn from Kenya?

First, digitization has pushed the retail electronic payments system to cover virtually the whole economy, including government services, pushing the government to accept an electronic payments ecosystem. One spill-over effect has been the formalization of most informal transactions, raising hopes that informal markets in Kenya, and indeed Africa, will one day shift towards formality. M-Pesa-type products have led to a vibrancy of financial markets cutting across all sectors and improved transactions at all levels from the formal to informal markets in Kenya and the East African region.

Second, Kenya shows how digitization can enable financial inclusion. The digital financial services platform has worked as a transactions platform, bringing the unbanked into the banking system. The platform supported the evolution of national retail payments; positioned banks as a platform to manage micro accounts through virtual savings products; enabled the evolution of virtual credit markets; micro insurance; and investments in government securities. It has also been useful in tracking fraudulent flows into personal accounts.

M-Pesa-type products have also created an endogenous demand for regulatory reforms, capacity, and technology. They have also driven demand for financial infrastructure—information capital (credit reference bureaus); deposit insurance; competition policy; and policies for consumer protection—the required institutions to regulate and protect the market further.

Third, digitization has enabled Fintechs to develop innovative business models with payments solutions or platforms sitting in commercial banks. Products like M-Akiba for micro investors in government securities, M-Kopa for solar energy supply, Once Acre Fund in agriculture, and many other products, are making a difference outside the financial sector. Once digitization has taken root in an economy, it allows for sustainable business models to be developed and launched on the digital platform to support other sectors of the economy.

Finally, digitization is now driving fiscal policy designs, revenue administration, and public finance management. It is reducing leakages in revenue administration, but more importantly, the digital tax payment platform is an important innovation for efficiency and transparency. Indeed, the digital platforms have revolutionized the way payments to and from the government are made. In addition, government services are being digitized across ministries and government agencies.

For digitization to be sustainable, four main areas of concern will need to be addressed.

First, challenges on the market side include connectivity, transparency, interoperability and the problem of market dominance, market segmentation, and associated regulatory challenges. Second, better institutions to protect the market, such as consumer protection laws and competition regulations, are essential. This may not require the creation of new regulatory institutions; existing laws can be amended and enhanced, and existing institutions strengthened in terms of capacity, as well as legal frameworks to support their regulatory

capabilities. There are already significant overlaps in regulatory agencies and creating additional ones will create room for diffusion of responsibility problems leading to regulatory failure. Third, market infrastructure issues will require attention, from improving connectivity to reducing unit costs. Finally, the identification system needs to be upgraded to provide the inclusive, privacy-protecting, e-ID that Kenyans will need as the country transitions further towards a digital economy and society.

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