All about the state-Fifty years of innovative technology to deliver an inclusive financial sector

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Abstract

This paper documents the long-term nature of technological innovations which have transformed retail finance and addressed financial exclusion. The paper also contributes to the body of literature on the state as an entrepreneur. The roots of financial inclusion are traced back to the 1960s with a discussion of the role played by the state, in contrast to that of the private sector and disruptive innovation. The case of the world-recognised mobile payment service M-Pesa, which has been credited with transforming access to financial services in Africa, is then examined. The empirical results suggest that the state was actively involved in the development and deployment of applications of information and communication technologies which led to M-Pesa. This study provides support for policies that promote mobile banking technology as a means of enhancing financial inclusion. The study also confirms that public-private partnerships, together with an enabling regulatory environment, facilitate technological innovation.

Keywords: Disruptive technology, financial inclusion, innovation, state as an entrepreneur, Kenya

JEL Codes: G20, H70, L30, O31, N0

1. Introduction

Conventional wisdom credits the private sector as the sole driver of the technological innovations used to address financial exclusion (Mendoza, 2007; U.S. Chamber of Commerce Foundation, 2015). This view, however, disregards the efforts by local and national governments, supranational organisations, social activists and non-government organisations to transform financial systems across the world to become more financially inclusive. In this paper, it is argued that the state has played a vital role in the development of the technological innovations used to foster financial inclusion.

An inclusive financial sector provides the vast majority of households and micro and small enterprises with access to a broad range of financial services while ensuring access to these services over time (Imboden, 2005). Early financial inclusion dates back to the 1960s to initiatives launched by the US Federal government. These formed part of L.B. Johnson's (1963-1969) broader policy interventions to address poverty and ethnic discrimination. Regulatory change that characterised the 1980s saw a number of countries adopting similar legislation to those described above in the USA. However, these initiatives mainly addressed the right of low-income individuals to have access to a cheque account.

The financial inclusion movement gained prominence in the 1990s when it expanded to include people with physical disabilities. Since then, financial inclusion has become associated with technological applications as a way of reducing poverty (Chibba, 2009; Hinson, 2011). The innovations used to address financial exclusion have been attributed to firms as diverse as infrastructure providers and mobile network operators (Demirgüç-Kunt *et al.,* 2018; Maurer, 2011; Okello, Bongomin, Ntayi & Munene, 2018), financial technology (fintech) start-ups (e.g. Gabor & Brooks, 2017; Jagtiani & Lemieux, 2017) and to a lesser extent, deposit-accepting financial institutions (Mullan, Bradley & Loane, 2017; World Bank, 2019b). These innovations, especially mobile banking, are described as disrupting the traditional banking sector and allowing consumers access to financial services, even in areas where bank penetration is low (Schmidthuber, Maresch & Ginner, 2018).

This narrative of innovation and disruptive technology perpetuates the perception of the private sector as the source of long-term economic development. At the same time, it minimises the state's role of providing the finance, the right environment and, in some instances, active involvement in the development of technologies and their application, which have succeeded in reducing financial exclusion.

This paper provides evidence that the state has played a pivotal role not only in promulgating a legislative framework but also in the development of technological innovations for financial inclusion. These efforts

of the state are explored in line with the contributions of Freeman and Duvall (1984), Leslie (2000), Bergquist and Söderholm (2011), MacKenzie (2018) and the recent contributions of Mazzucato (2011, 2014) on the entrepreneurial state. Empirical support emerges from a reinterpretation of public sources (such as newspaper articles, policy papers, reports by consultants and systematic studies by academics) and in particular, the narrative around the disruption of Kenyan retail financial services by M-Pesa.

The rest of this paper is organised as follows: Section 2 discusses the concepts of disruptive and state-led innovations. Section 3 outlines the historical development of financial inclusion while section 4 explores the technological innovation behind one of the world's most successful mobile payments services, M-Pesa. Section 5 summarises the findings and offers suggestions for future research.

2. About disruptive and state-led innovation

Several reasons can be put forward for the seeming dominance of the private sector in developing innovations. On the one hand, there was criticism of inadequate financial support from state institutions in the late 1970s and the resultant low rate of new business formation in the US (Fenn, Liang & Prowse, 1997). At around the same time, similar criticisms were levelled at UK state institutions and commercial banks (e.g. Coopey & Clarke, 1995; Bátiz-Lazo & Wardley, 2007).

On the other hand, there is the so-called "neoclassical economics school of thought". This is usually characterised by a combination of the following features: emphasis on rationality and utility maximisation, emphasis on market equilibrium and neglect of strong kinds of uncertainty, particularly fundamental uncertainty (Dequech, 2007). This school of thought posits that competition leads to an efficient allocation of resources within an economy, with the forces of supply and demand creating market equilibrium. Proponents of this approach view the state's involvement in markets as "fixing a market failure" (Lazonick & Mazzucato, 2013). This rationale stems from the idea that the state is not active in the market in the first place, but rather businesses and other organisations undertake the bulk of economic activity. However, throughout the 20th century, governments have taken an active role in creating industries, technologies and markets (MacKenzie, 2018; Mazzucato, 2014).

Lazonick (2007) points to the active role of the state in developing the capabilities of the future labour force through its investments in federal, corporate and university research laboratories, and through educational institutions. These investments augment the productive power of the economy through the

creation of new knowledge while business enterprises have made ample use of this knowledge and capability. In the case of the US, state agencies (as opposed to state-owned enterprises) stemming from the New Deal created projects and stimulated innovation through political and financial prioritising (Scranton, 2006). The New Deal was a series of programs, public work projects, financial reforms, and regulations to address the needs for relief, reform, and recovery from the Great Depression. Freeman and Duvall (1984) suggested that the scope of the state's involvement in production extends beyond market regulation, defence and the provision of infrastructure, to engaging directly in the production of capital and consumer goods.

A number of systematic studies have indeed explored the role of the state in the genesis and financing of innovations. In his seminal work, Leslie (2000) documented the military's role (intentional or otherwise) in creating and sustaining Silicon Valley and how this contribution had been largely overlooked in most accounts of the Valley's success. Silicon Valley has since become recognised worldwide as a powerhouse of innovation and business creation (Engel, 2014). For their part, Block and Keller (2009) contend that 77 (88%) of the 88 most important innovations (as rated by R&D's annual awards) in the US between 1971 and 2006 had been fully dependent on the support of the federal government. This was especially the case during the early years of that period. The remaining 11 (12%) of the top innovations were not subject to federal funding but relied entirely on investments by the private sector.

However, the contributions of Mazzucato (2011, 2014) stand out in placing the state as a key actor in the process of innovation. Mazzucato (2011) asserted that the state plays an active role in the development of innovation, contrary to a Keynesian emphasis on taxation, subsidies, spending and regulation; or Schumpeter's emphasis on creating the "right conditions" for innovation and growth. Mazzucato (2014) documents several case studies, shedding light on how public sector institutions initially funded all of the technologies that made Apple's i-products (iPhone, iPad, etc.) "smart", namely, the Internet by the Defense Activated Research Projects Agency (DARPA), the global positioning system (GPS) by the US Navy, the touchscreen display by the Central Intelligence Agency (CIA) and the voice-activated personal assistant, Siri, also by DARPA. In short, Mazzucato (2014) suggests that the state assumed the role of an entrepreneur in many key innovations of the late 20th and early 21st centuries.

Alongside these affirmations of innovation, a growing number of studies have criticised the excessive interest in the "white heat" moment of innovation as opposed to the greater use of resources in keeping machinery and infrastructure running (Vinsel & Russell, 2020). Examining this debate in greater detail is beyond the scope of this study. Suffice to say that innovations are broadly classified as either incremental

(continuous) or radical (discontinuous), depending on the degree of change associated with the innovation (Ettlie, Bridges & O'Keefe, 1984). The process of incremental innovation development relates to product improvements, upgrades and line extensions, reinforcing the existing capabilities of the organisation (Ettlie *et al.,* 1984; Veryzer, 1998). In contrast, radical innovation development relates to fundamental changes in the activities of an organisation, industry or society and represents a clear departure from existing practices (Bátiz-Lazo & Woldesenbet, 2006; Veryzer, 1998). Since the mid-1990s, research of radical innovations has been increasingly explored using the terminology of "disruptive innovations" (Kilkki, Mäntylä, Karhu, Hämmäinen & Ailisto, 2018).

The term "disruptive innovation" [1] or "disruptive technology" was coined by Joseph Schumpeter (1883-1960). As noted by McCraw (2007), Schumpeter's appointment to Harvard in 1932 opened up an avenue for Austrian ideas on disequilibrium and business cycles into mainstream economic thought (which had, and to some extent continues to be, dominated by Marshallian ideas of market equilibrium). Schumpeter went further and became one of the first scholars to systematically explore the role of new, technology-based firms in causing economic growth and development.

In 1942, the concept of "creative destruction" was formalised as a process "that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one" (Schumpeter, 1942, p. 83). Schumpeter's (1942) ideas on creative destruction posited that innovation causes market dislocations. This allows for the rise of new firms and the corresponding decline of the large incumbent firms whose leadership positions they assume (Spencer & Kirchhoff, 2006). The role of the entrepreneur was to disturb the equilibrium. However, new technology is only possible if there is access to credit and financing, emphasising the importance of financial markets (Gaffard, 2008).

It is beyond the scope of this study to provide full details of the genealogy of "creative destruction". Suffice to say that Christensen (1993) and shortly after, Bower and Christensen (1995), further developed the concept while analysing the failure of businesses to stay abreast when technology or markets changed. They argued that this process emanated from "disruptive technologies" (p. 45), claiming that customers have an important role in directing the activities of management, especially in the development of new technologies. However, by placing excessive reliance on the needs and perceived needs of their customers, existing incremental technologies may be favoured over disruptive ones. Companies that do not invest in disruptive technologies risk being blindsided by new emerging technological innovations.

[1] In this paper, there is no systematic distinction between "disruptive innovation" and "disruptive technology".

Managers will thus be unable to "catch the wave" of these new technologies and will see their companies fail.

Christensen (1997) popularised the widespread use of terminology around "disruptive innovation". He explored in detail the reasons for the failure of respected and well-managed companies. Christensen (1997) maintained that by focusing on their main customers and seeking their opinions before investing in new technologies, managers ran the risk of ignoring rivals with disruptive technology. This is because, according to Christensen, a disruptive innovation introduces new devices or ways of doing things, effectively offering a new performance package. This process frequently redefines market boundaries and creates new customer groups. The technology, he continues, initially underperforms in existing ways of doing things in terms of the primary performance dimension of the products valued by main customer groups. In other words, in the early stages, the new technology only finds application and consumer interest in niche markets. Some examples of this would be the personal computer which was regarded as the preserve of hobbyist in the 1970s, before the launch of Apple II (1977) or the IBM PC (1981). Over time, this disruptive innovation improves on the primary dimension to the extent that it eventually appeals to mainstream customers and displaces the incumbent technologies as well as firms whose business model and value chain are geared to the outgoing technologies (Adner, 2002). A prime example is the launch of Windows 95 (1995) for the personal computer.

As mentioned above, Christensen's ideas received widespread acclaim over the years, with Google's N-Gram Viewer suggesting the point of inflection came in 2001[2]. Citations of both popular press and academic articles also suggest a steep upward trend from 2001 (Christensen, McDonald, Altman & Palmer, 2018). Soon, the term "disruptive innovation" became common in all sorts of publications, with a quick search by Google estimating over 40 million online documents using it in 2019.[3] Indeed, some universities even offer modules in disruption studies.[4]

[2] See: https://books.google.com/ngrams/graph?content=disruptive+innovation&year_start=1990&year_end=2008&corpus=0&smoothing=3&share=&direct_url=t1%3B%2Cdisruptive%20innovation%3B%2Cc0#t1%3B%2Cdisruptive%20innovation%3B%2Cc0. Accessed 18 August 2019.

[3] See: https://www.google.com/search?client=firefox-b-d&q=disruptive+innovation. Accessed 8 August 2019.

[4] For example: the *London School of Economics'* "Cryptocurrency and Disruption", retrieved 18 August 2019 from http://www.lse.ac.uk/study-at-lse/Online-learning/Courses/Cryptocurrency-Investment-and-Disruption; *The Saïd Business School's* "The Oxford Digital Marketing: Disruptive Strategy Programme", retrieved 18 August 2019 from https://www.sbs.ox.ac.uk/oxford-digital-marketing-disruptive-strategy-programme and *Harvard's* "Disruptive

For all their fame and common use, Christensen's ideas on disruptive innovation have since come under fire (King & Baatartogtokh, 2015; Markides, 2006; Schmidt & Druehl, 2008; Weeks, 2015). Christensen already admitted that the term was often loosely applied to explain the concept of innovation, particularly when explaining any industry shake-ups (Christensen, Raynor & McDonald, 2015). However, it was Lepore's (2014) article in *The New Yorker*, in which Christensen's ideas were heavily criticised, that drew widespread international attention to the topic (e.g. Bennet, 2014; Hill, 2014; Krugman, 2014). Yet regardless of criticism in systematic studies or the media, few terms in recent literature on innovation management are said to have been used as frequently as "disruptive innovation" (Schmidt & Druehl, 2008) or considered as important in understanding the demand-side role of technology competition (Adner, 2002).

It was not surprising then, that in the debate over mobile money as a potentially disruptive technology, there was an absence of any state actors in the development and widespread adoption of this technology. Indeed, the disruptive nature of mobile money was identified in the early stages of mobile banking adoption. For instance, Ondrus and Pigneur (2006) describe how the technology required for mobile payments could improve through research and development and move away from catering only for a niche market to compete with incumbents (financial institutions) for mainstream customers. The authors conclude that mobile payments have the potential to take over the retail payments market for on-the-spot transactions "as the different stakeholders [agreed] that this could be the next big evolution in the payment market" (p. 255). Schmidthuber *et al.* (2018) describe mobile payment technology as providing a new performance dimension for products where previously there was no competition. Industry publications also view mobile money as transforming the financial services landscape and disrupting established financial services providers (Ernst & Young, 2019; GSMA, 2015; Napier, 2011; PricewaterhouseCoopers, 2016). The same trend has caught on in the popular media, which hails mobile payments and fintech providers as "disruptive innovations" (Kilkki *et al.,* 2018; Lirtsman, 2016; Miller, 2019).

Omwansa and Sullivan (2012) describe the hugely successful mobile payment service M-Pesa in Kenya as a disruptive mobile money innovation. Mbiti and Weil (2016) concur that as a mobile money transfer service, M-Pesa revolutionised the money transfer industry, becoming the dominant mobile transfer

Innovation: Strategies for a Successful Business", retrieved 18 August 2019 from https://www.exed.hbs.edu/disruptive-innovation/.

service in Kenya in 2009 (p. 254). Thus, the financial services industry was transformed by low-cost technology that could be used by anyone subscribed to the service on any mobile phone, that is, without the need for an internet connection and regardless of the device's data processing capabilities.

Against a backdrop of disruptive innovation and transformation, the remaining sections of this paper explore whether this was indeed the case with the technological innovations used to address financial inclusion. This exploration ascertains the extent to which the state played a role in the development of mobile payments technology as a means of enabling financial inclusion, with particular reference to the case of M-Pesa.

3. Role of the state in the development and adoption of technology for financial inclusion

A distinction can be drawn between attempts at financial inclusion which took place as part of broader interventions to address poverty and segregation in the mid-1970s and those which took place more recently, in the 21st century. The earlier interventions stemmed from the New Deal policies and the social injustices that led to the civil rights movement (1954-1968) in the US. Specifically, President L.B. Johnson declared a "war on poverty" in his state of the union address in 1964 (Danziger & Danziger, 2005). At the time, poverty levels were estimated to affect 17.3% of the total population in the US (House Budget Committee, 2014). President Johnson also set out a number of strategies to tackle poverty (Johnson, 1964a) and in his Economic Report to Congress, he reaffirmed the need to fight discrimination to ensure that all citizens had equal opportunities for education, jobs, good health and housing (Johnson, 1964b).

In response to President Johnson's call for poverty alleviation, Congress passed the Economic Opportunities Act in August 1964 and established the Office of Economic Opportunity to administer the local application of federal funds targeted at poverty relief. The Federal Truth in Lending Act was enacted in 1968 to prevent, among others, ethnic discrimination in lending. Federal Truth in Lending has been described as pioneering legislation in the field of consumer credit regulation (Rohner & Miller, 2000).

Federal Truth in Lending was the first of many other pieces of legislation passed in the 1970s and 1980s to discourage deposit-taking and retail lending financial institutions from discriminatory behaviour and any other practices that supported segregation (Carbó Valverde, Gardener & Molyneux, 2007). As specified by Kane (1981), these regulatory changes are listed in Table 1.1.

Table 1. Regulations passed by US Congress

Regulations	Date
Fair Credit Reporting Act	1970
Fair Credit Billing Act	1973
Equal Credit Opportunity Act	1974
Real Estate Settlement Procedures Act	1974
Fair Credit Billing Act	1974
Home Mortgage Disclosure Act	1975
FTC Holder-in-Due Course Rule	1975
Consumer Leasing Act	1976
Fair Debt Collection Practices Act	1977
Community Reinvestment Act	1977
Financial Institutions Regulatory Act	1978
Right to Financial Privacy Act	1978
Electronic Funds Transfer Act	1978

***Source**: Kane (1981)*

As can be seen from Table 1, these pieces of regulation aimed to ensure that minorities, and particularly African Americans, had fair access to retail banking services such as current accounts and credit facilities. Regulatory interventions also sought to eliminate "red-lining" activities of financial institutions, that is, practices where retail financial institutions would refuse to provide credit (particularly house mortgages in urban areas) to minorities despite the individual being creditworthy (US Treasury, 2010; Hillier, 2003; Cohen-Cole, 2010). The Housing and Community Development Act, also known as the Community Reinvestment Act of 1977, required financial institutions to advance credit throughout all of the geography of their operation and prohibited banks from limiting credit only to high-income neighbourhoods (Sarma & Pais, 2011). The spirit of the Community Reinvestment Act was to affirm the

obligation of financial institutions to serve the needs of the community, including deposit-taking and credit, in the areas in which they were mandated to do business (US Congress, 1977).

Regulatory changes in the 1970s had a profound impact on lower-income groups, with bank fees increasing more for the poor, especially those unable to maintain minimum balances (Canner & Maland, 1987). A number of bank branch closures also affected these customer groups. These and other contributing factors led many of the less affluent consumers dropping out of the banking system (Brobeck, 1991). Social action groups noted that this phenomenon gave rise to the "lifeline" bank movement, which voiced concerns that low-income groups were excluded from having bank accounts (Washington, 2006). This term was applied after the partial deregulation of banking and called for access to financial services for low-income groups at reduced costs (Canner & Maland, 1987).

The call for "lifeline banking" was persistent throughout the 1980s, underlying the fact that a large proportion of low-income families did not have access to cheque or savings accounts and had to rely on cash, storefront cheque-cashing outlets and other mechanisms, often with very high service charges (Rubin, 1992). The likes of the Consumers' Union and the Consumer Federation of America played an active role in lobbying Congress in the late 1970s and 1980s on banking matters while trying to pass regulations that would enable low-income groups to return to the banking system (Brobeck, 1991). Consumer advocates argued that high fees and the maintenance of minimum balances were strong barriers to financial access of low-income individuals, and even more so amongst ethnic minorities.

A key development took place in 1986 when the Federal Financial Institution Examination Council announced its approval of a Joint Policy Statement on Basic Financial Services (Federal Financial Institution Examination Council, 1986). Through this statement, the Council recognised basic banking needs to include the following: a safe and accessible place to store money, the means to withdraw money and to the ability to make payments to third parties (Canner & Maland, 1987). The statement was followed by two household surveys conducted by the Federal Reserve Board, namely, the Consumer Credit Survey (1977) and the Survey of Consumer Finances (1983). Together they illustrated the extent and depth of financial exclusion in the US. These survey results estimated that close to 9.5 million (12%) of all US households did not have access to a savings or cheque account (Canner & Maland, 1987). The poorest households were the worst affected as 66% did not have access to savings or cheque accounts (Rubin, 1992). Furthermore, bank branches and ATMs were disproportionately located in high-income urban areas with only a few branches in low-income and minority residential areas (Brown, 1990). Additionally, prior to the passing the Americans with Disabilities Act (1990), there was no provision in the design and

layout for the physically handicapped in retail bank branches, telephone banking or ATMs (Feingold, 2016).

Meanwhile, in Europe, a number of regulatory changes occurred to help low-income individuals to access bank accounts. Most of these, however, were national rather than regional or continental initiatives. For instance, France legislated the principle of a person's right to have a bank account via article 58 of the Banking Act in 1984 (Comité de la Réglementation Bancaire et Financière, 1984: Article 58). In 1998, the French parliament reiterated the right to open a bank account (as per the 1984 legislation) and provided the right to basic bank account services. In 1992, the *Fédération Bancaire Française* (French Banking Federation) committed to providing affordable bank accounts with services that included a cash card, free access to a cash machine network, bank statements and a minimum number of cheques paid or cashed commission-free (Kempson, Atkinson & Pilley, 2004).

In 1987, Sweden passed the SFS 1987:617 *Bankrörelselag* (Law of Banking Business) which prohibited banks from refusing to open a savings or deposit account (Finansdepartementet, 1987). In 1996, the German *Bundesverband Deutscher Banken* (German Bankers' Association) also adopted a voluntary code that made provision for the *Jedemann-Konto* (Everyman Account), which was a current account without overdraft facilities (Sarma & Pais, 2011). In 1997, the *België Bankier Vereniging* (Belgian Bankers' Association) adopted a voluntary code of banking practice which provided for the right of every citizen (regardless of the amount or frequency of income) to open a savings account (Carbó Valverde *et al.,* 2007).

As can be seen from the examples above, in the 1990s, economic geography was an important determinant in addressing financial exclusion (Leyshon, French & Signoretta, 2008). Around this time, the term "financial exclusion" was coined by those concerned about the limited access to bank branches as a number of retail bank branch closures had taken place (European Commission, 2008). Leyshon and Thrift (1995, p. 4) define financial exclusion as "processes that … prevent certain social groups and individuals from gaining access to the financial system". Research into the effects of bank branch closure outside the US suggests similar trends as in North America, where the greatest number of branch closures seemed to be in the poorest areas (Leyshon *et al.,* 2008; Leyshon & Thrift, 1993, 1994, 1995; Pollard, 1996).

The Consultative Group to Assist the Poor (CGAP) was established in 1995 as a non-profit organisation for the advancement of microfinance standards and for the advancement of more inclusive financial systems for the poor (CGAP, 2008). CGAP consisted of a global partnership of more than 30 leading development

organisations[5] to advance the lives of the poor through financial inclusion (CGAP, 2019). It could be argued that the formation of the CGAP marked the inflection point at which financial exclusion was no longer a domestic issue but one affecting all nations, regardless of their degree of industrialisation. Financial inclusion thus came to the forefront in the 1990s, in part due to the perceived importance of reducing financial exclusion to facilitate long-term growth (Amidžić, Massara & Mialou, 2014).

As the 1990s progressed, the drive for financial inclusion began to be actively promoted by finance ministries and central banks around the world, primarily seeking to improve access to retail financial services for those who would otherwise be excluded (Amidžić *et al.,* 2014). The establishment of the Millennium Development Goals in 2000 reiterated the need for financial inclusion and emphasised the importance of coordinated actions to achieve this goal in governments, civil society and the private sector across the globe (United Nations, 2006, 2014). As a result, at the G20 meeting held in Seoul in 2010, the leaders of the G20 countries formally recognised that financial inclusion was a key pillar of long-term global economic development (Global Partnership for Financial Inclusion, 2019).

The Alliance for Financial Inclusion, a network of central banks, supervisors and other regulatory authorities, met in Mexico in 2011 to agree on a common set of principles. These principles were to inform financial inclusion policies to meet these measurable commitments (Alliance for Financial Inclusion, 2012). As a result of these discussions, common principles were identified to address financial exclusion. These came to be known as the Maya Declaration (Garang, 2014).

Also in 2011, the Global Findex Survey was launched by the World Bank to provide comparable information from 148 countries on how people save, borrow, make payments and manage risk. The results of the first survey in 2011 revealed the extent of exclusion, with an estimated 2.5 billion people – more than half of the world's population – not having access to financial services (Demirgüç-Kunt & Klapper, 2012a). Figure 1.1 below illustrates the approximate percentage of adults who had a bank account at the time of the first Global Findex Survey in 2011.

[5] For more information on these organisations see https://www.cgap.org/about/member-organizations, retrieved on 20 August 2019.

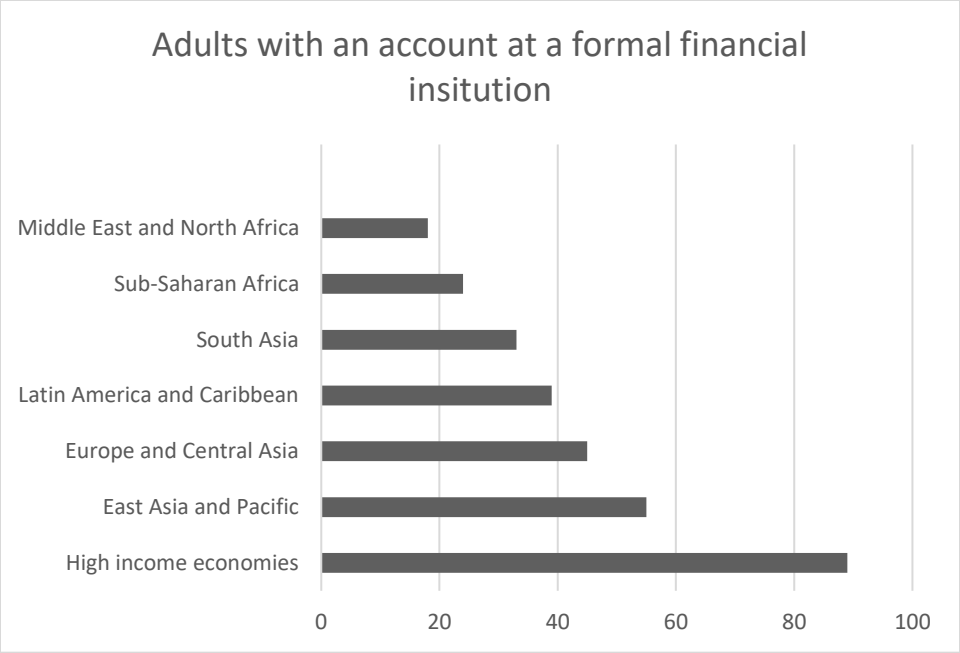

Figure 1. Global access of adults with a bank account at a formal institution in 2011

***Source**: Demirgüç-Kunt & Klapper (2012b)*

As can be seen in Figure 1, the Global Findex Survey results revealed that an estimated 90% of the unbanked population was found in emerging economies (Alliance for Financial Inclusion, 2019). These results reaffirmed the pressing need to design common strategies with clear targets to address financial exclusion (Demirgüç-Kunt, 2014).

As the drive for financial inclusion took hold, so did the links between this policy effort and the use of technology to achieve it. For instance, as early as 1999, the importance of technology was evidenced in the establishment of the Social Exclusion Unit by the UK government. This Unit brought together various stakeholders into Policy Action Teams, with the specific mandate of addressing social and financial exclusion (Mitton, 2008; Social Exclusion Unit, 2001). Reports emanating from these efforts not only estimated the number of people without access to financial services but also identified core retail banking features dependent on existing technology (New Policy Institute, 2007). These included wage, salary and benefit payments deposited directly into a bank account through an automated credit transfer, cash withdrawals at convenient access points (including access to ATM by the physically disabled) and bill payment by direct debit or credit transfer (Carbó Valverde *et al.,* 2007; HM Treasury, 1999).

Other notable early initiatives included that of the Australian government, which in 1997 piloted the use of electronic benefit transfers to process social welfare payments directly into bank accounts. The success

of this project led to a significant number of new bank accounts being opened amongst low-income individuals and minorities (Kempson *et al.,* 2004; Warton, 1999). Also in 1997 and with similar aims, the US Treasury introduced a policy which would require all government payments to be made by electronic funds transfer (EFT) (Barr, 2004; US Department of Treasury, 1997). As was the case in Australia, this initiative had a significant impact on the number of new bank accounts being opened amongst low-income individuals and minorities (Mitton, 2008).

Similar to the US and Australia, in 2003 the UK issued a policy which required the payment of social security benefits and state pensions directly into bank accounts through EFTs (Kempson *et al.,* 2004). Many other countries thereafter also introduced EFTs for government payments. These efforts were based on the notion that government-to-person (G2P) payments could drive transaction volume (both up or down), decrease transactions costs and draw more low-income individuals into the financial system (Pickens, Porteous & Rotman 2009).

Many non-banks were effectively leveraging wireless technology to meet the financial needs of unbanked or underbanked consumers (Bomser, 2010). By using the benefits of electronic money, regulators and the industry could play a complementary and dual role to provide consumers with easily accessible and affordable financial services (Minor, 2015). The World Bank also recognised the power of mobile technology, especially in Sub-Saharan Africa, through the aforementioned Global Findex Survey (Demirgüç-Kunt & Klapper, 2012b). In a 2011 report entitled "The Mobile Financial Services Report", the World Economic Forum acknowledged the use of mobile technology in delivering financial services to the unbanked poor (World Economic Forum, 2011). Meanwhile, the United Nations emphasised the use of innovations in digital and mobile banking as a means of addressing financial exclusion. Consequently, in 2012, the United Nations established the "Better than Cash Alliance" to advocate the digitisation of cash payments, in partnership with various donors, to alleviate poverty and drive inclusive growth (Better than Cash Alliance, 2019). In 2014, the United Nations Capital Development Fund launched the "Mobile Money for the Poor" programme in partnership with the Australian government's agency for foreign aid, "AusAid". The programme encouraged poorer countries to use mobile banking for the retail delivery of services (UN Capital Development Fund, 2019).

On the one hand, therefore, in responding to social inequalities and racism the state gave birth to financial exclusion in the 1960s. On the other hand, the state has also been active in shaping the development of this agenda. As this agenda evolved, the state played a pivotal role across the globe, particularly in using technology to boost the number of bank accounts since the late 1990s. This served to decrease financial

exclusion amongst the low-income population and ethnic minorities. As the next section illustrates, this was also the case in Africa and specifically, in the development of a mobile payments service called M-Pesa.

4. Financial inclusion in Africa and M-Pesa

As was the case in the US, Australia and Europe, countries in Africa also took steps to promote financial inclusion. In 2004, South Africa adopted a Financial Services Charter, with clear financial inclusion objectives and an agreement with the Banking Council resulted in the launch of a low cost, "no-frills" bank account called the "Mzansi" account (Sarma & Pais, 2011). This action was taken by individual banks on a voluntary basis in an attempt to redress the high number of the population who were excluded from the financial system.

Nigeria addressed financial exclusion by implementing a "Cashless Policy" in June 2012 (Ezuwore-Obodoekwe, Eyisi, Emengini & Chukwubuzo, 2014). This policy had three primary objectives: (i) to promote the development and modernisation of the payment system, (ii) to reduce the cost of banking and promote financial inclusion and (iii) to improve the effectiveness of monetary policy in managing inflation and economic growth targets (Central Bank of Nigeria, 2011). Nigeria was (and remains) a largely cash-based economy. It was hoped that this policy would curb the demand for banknotes and coins whilst encouraging the use of electronic banking (Ezuwore-Obodoekwe *et al.,* 2014).

From the mid-2000s, various countries throughout Africa began to use mobile technology as a means of reaching the unbanked. Mobile phone operators increasingly recognised the potential for this technology to offer affordable basic banking services securely using the existing telecommunications infrastructure (Tieman, 2008). The lack of retail banking infrastructure together with the prevalence of mobile phones in Africa provided the ideal platform for mobile banking to meet the needs of the unbanked (Pilling, 2016). In many parts of Africa, urban workers send money to relatives through friends or by giving the money to bus drivers for a fee, however, they were at risk of theft through this cumbersome way of transferring money (Kantai, 2010).

In November 2004, the first mobile banking product called "Wizzit" was launched in South Africa to provide mobile banking services aimed at the low income, previously unbanked, population (Ismail & Masinge, 2012). In the following year, MTN (one of the largest mobile network operators) launched "MTN

Banking" in partnership with Standard Bank. The mobile banking services provided full-service transactional banking. Users were provided with a MasterCard plastic payment card and access to the existing retail banking network. In addition, it allowed users to purchase prepaid electricity and mobile airtime (Anong & Kunovskaya, 2013). However, uptake was sluggish and the complexity of the product was identified as one of the barriers to adoption (Tieman, 2008). Soon after, the other major banks in South Africa launched mobile banking in partnerships with mobile telecommunications operators (Lawack, 2012).

Kenya has shown remarkable success with mobile banking, chiefly due to its mobile money service, M-Pesa (with the "M" denoting mobile and "Pesa" denoting money in Swahili). This product was launched in 2007 by the mobile network operator, Vodafone, together with Kenya's largest mobile network provider, Safaricom. These mobile payment services have been described as life-changing for millions of the poorest of the poor, by giving them access to bank accounts and financial services (Peel, 2009; Wighton, 2011).

The idea behind M-Pesa began with Vodafone looking at ways to address issues such as the Millennium Development Goals to halve poverty by 2015. Nick Hughes, the Vodafone executive who initiated the M-Pesa project, met with the representative from the UK's Department for International Development (DFID) at the World Summit for Sustainable Development in 2003 and was encouraged to submit a proposal to obtain funding from the recently set up Financial Deepening Challenge Fund (FDCF) (Hughes & Lonie, 2007).

A challenge fund can be described as an investment vehicle that provides grants or subsidies with an explicit public purpose between independent agencies, with grant recipients selected on a competitive basis through advertised rules and processes (O'Riordan, Copestake, Seibold & Smith 2013). Challenge funding requires competition winners to commit to delivering measurable outputs; the progress of the project is monitored against an action plan and includes sanctions for poor performance (Foley, 1999). Challenge funds thus assist with the provision of funding (to overcome typical internal competition for capital within an organisation). These funds can play an important role by initiating projects in new areas of business that can be regarded as riskier (Hughes & Lonie, 2007). Grant recipients retain significant discretion over the formulation and execution of their proposals and share risks with the grant provider (O'Riordan *et al.,* 2013).

The FDCF made £15m available for joint investments with the private sector for projects to improve access to financial services (Nathan, 2018). The mandate for the FDCF fund managers and proposal assessment

team was seeking proposals involving the development of a new product or service; a new service that could provide customers with access to goods or services that were currently unavailable to them; or the application of a technology that would reduce the cost of service provision (Hughes & Lonie, 2007). The M-Pesa project received funding of approximately £1 million in 2004 and this amount was matched by Vodafone (Cook, 2015).

Through the M-Pesa project, Vodafone entered into a new market, using its existing infrastructure to provide financial services specifically to the poor and previously unbanked. The vision of the M-Pesa team, under the leadership of Nick Hughes based in the UK and Susie Lonie in Kenya, was that the convenience of transferring small amounts of money electronically could have social and economic benefits in countries where the vast majority of people did not have access to traditional banks (Fildes, 2010). Vodafone first considered purchasing an off-the-shelf financial services platform, however, they did not find one that suited their needs. As a result, they appointed Sagentia, a UK software developer specialising in "blue sky" strategic development, as the technical partner to develop the service (Hughes & Lonie, 2007). A small, dedicated team at Sagentia oversaw the development of the user application for the mobile phone, the communications software within the network and the centrally hosted account management system (Wooder & Baker, 2012). Importantly, the system also had to be extremely cost-effective as the sums of money transferred could be as little as 100 Kenyan Shillings (75 pence) (Sagentia, 2019).

In 2005, Sagentia finished product development after obtaining detailed specifications and identifying the needs of customers. The M-Pesa pilot project was then launched (Wooder & Baker, 2012). The pilot partnership was created between Vodafone, Safaricom, a microfinance institution called Faulu Kenya and the Commercial Bank of Kenya (Hughes & Lonie, 2007). Safaricom had a dominant position in mobile telephony in Kenya with approximately 77% of the total market share (Mas & Morawczynski, 2009). Safaricom saw the opportunity to retain its mobile network customers in a competitive Kenyan market by providing a mobile money service (Manson, 2014).

The initial service offering during the pilot phase had the following features: the ability to send and receive money and to buy airtime for the user or for other registered users on the same network via SMS (Wooder & Baker, 2012). The M-Pesa team used existing technology to create an innovative service, effectively monetising the airtime balances and providing basic financial services. At the time of the launch, Kenya had only 450 bank branches, 600 ATMs and 350 Western Union agents across the country with an estimated population of 36 million (Vaughan, 2007). This equates to 3.55 bank branches for every 100,000

adults compared the world average of 10.74 branches per 100,000 adults in 2007 (World Bank Group, 2019a).

In March 2007, after the success of the pilot, the M-Pesa service was officially launched in the market (Morawczynski, 2009). The absence of alternatives for domestic money transfers fuelled the growth of M-Pesa customers (Mas & Morawczynski, 2009). Michael Joseph, CEO of Safaricom (2000 – 2010) who pioneered M-Pesa in Kenya, attributed the success of the project for facilitating the safe transfer and storage of cash on mobile phones as opposed to notes and coins (Crabtree, 2012). Joseph further identified distribution as key in meeting customers' needs cost-effectively and at scale, by having partnerships between manufacturers of products and retailers who could distribute these services (Tescher, 2011). The small retail stores were crucial to the uptake of M-Pesa services as these retailers acted as *de facto* bank branches (Tescher, 2009). Agents around the country (utilising the existing Safaricom outlets) converted e-money into currency and *vice versa* (Jack & Suri, 2011). Importantly, the Central Bank of Kenya (CBK) exempted the agent banking (correspondence) network from the onerous regulation that governed banks and other financial institutions and allowed M-Pesa to contract with thousands of retail agents to offer their services (Burns, 2018).

The M-Pesa project team engaged with the CBK in the early stages of the project, before the service was launched. After detailed discussions, further developments of the service were made (Alliance for Financial Inclusion, 2010). Kenya did not have clear regulations in place for e-money services and the CBK obtained a legal opinion that the M-Pesa service did not need to meet the definition of a banking business and therefore did not need to comply with requirements of the Banking Act of 1989, as it was simply regarded as a service that facilitates the transfer of money (Porteous, 2009). The CBK issued a letter confirming that it did not have an objection to the launch of M-Pesa. However, M-Pesa was governed by a monitoring framework, which allowed it to operate under limited regulation, in the absence of a detailed regulatory framework for mobile payments (Porteous, 2009). This framework ensured that there were safeguards to address money laundering, consumer protection as well as product and agency concerns (Alliance for Financial Inclusion, 2010). M-Pesa services expanded in 2008 to include bill payments, bulk salary payments, cardless transactions at ATMs to allow customers access to M-Pesa services at PostBanks (Kenyan Post Office Savings Bank) (Muthiora, 2015). The CBK also authorised M-Pesa to provide foreign exchange business in 2008 (Ondiege, 2015).

The enabling regulatory environment facilitated by the CBK has been credited as key to the success of the large scale investments in new mobile technologies such as M-Pesa (Beck, Senbet & Simbanegavi, 2015;

Burns, 2018; Ondiege, 2015; Porteous, 2009a). An enabling regulatory approach permits non-banks to issue electronic money, imposes capital requirements that are proportional to the risks of the e-money businesses, permits agents to cash-in and cash-out electronic money and does not prescribe the implementation of interoperability (i.e. it allows a market-led approach) (GSMA, 2014). An enabling environment is an important component of successful mobile banking adoption and for the fast growth in mobile banking services (GSMA, 2017).

The CBK took an open, flexible supervisory and regulatory approach to mobile banking. This is in contrast with the traditional regulatory approach towards innovation beginning with legislation, then regulation and lastly innovation, which could take years (Beck, Senbet & Simbanegavi, 2015). In contrast, the CBK took a risk-based approach and allowed the innovation to take place (Cook, 2015). Other SSA countries such as Botswana, Ghana, Nigeria and South Africa did not adopt an enabling regulatory environment and these countries have not been successful in the wide-spread adoption of mobile banking for the period 2007 to 2015 (Burns, 2018). These countries had adopted a bank-led approach to mobile financial services and required mobile banking service providers to comply with strict banking legislation.

The regulatory approach taken by the Kenyan CBK was met with opposition. According to Michael Joseph, former CEO of Safricom, the banks in Kenya tried to thwart M-Pesa and formed a group to oppose the project (Crosman, 2011). The banking industry raised concerns to the Kenyan Minister of Finance that M-Pesa would not be able to develop the risk management skills and procedures to manage such a large payment system while the Kenyan Bankers Association accused the CBK of allowing a non-bank to provide financial services without needing to comply with onerous banking regulations (Burns, 2018). In response, the CBK ordered a due diligence audit to address the concerns raised by the banking industry. This took place towards the end of 2008 (Muthiora, 2015). The results of the audit confirmed that M-Pesa payment service was secure and reliable, reiterating that mobile money service providers were not banking service providers[6] (Alliance for Financial Inclusion, 2010).

The CBK did, however, place a limit on the value of transactions (to address money laundering concerns), requiring agents to pre-deposit cash in a bank account in commercial banks (e-float), from which an electronic value was used to guarantee all consumers' deposits and withdrawals (Alliance for Financial

[6] A banking business as defined in the Banking Act (Central Bank of Kenya, 2009) is as follows: "(a) the accepting from members of the public of money on deposit repayable on demand or at the expiry of a fixed period or after notice; (b) the accepting from members of the public of money on current account and payment on and acceptance of cheques; and (c) the employing of money held or on current account, or any part of the money, by lending, investment or in any other manner for the account and at the risk of the person so employing the money".

Inclusion, 2010). The interest earned from these deposits was given to a non-profit trust (Burns, 2015). The regulations regarding know-your-customer (KYC) and anti-money laundering (AML) were much less stringent and were proportionate to size. The CBK permitted Safaricom to apply less stringent identification standards as Safaricom had imposed limits on the amount that could be held in the mobile money account or transacted in a given period. This facilitated access to financial services, particularly for rural communities which lacked formal documentation and rural banks that often did not have a cost-effective way to identify customers (Burns, 2018). It was hoped that M-Pesa could reach the unbanked in Kenya, especially in light of the findings of the 2006 FinAccess Survey which suggested that only 18.9% of the Kenyan population had access to formal banking services (Financial Sector Deepening Kenya, 2006).

In 2009, the Finance Act allowed for agent banking which allowed banking agents to offer mobile banking across Kenya. Thus it was telecommunications companies which predominantly drove the mobile banking model as they were largely exempted from banking regulations (Kantai, 2010). In 2010, the CBK altered the regulations again to allow commercial bank agents and their retail outlets to initiate new accounts and increased the number of deposits and withdrawals that could take place (Sadana, Mugweru, Murithi, Cracknell & Wright, 2011). Commercial banks were thus able to engage in agent banking while customers could access banking services without having to travel large distances to urban bank branches (Burns, 2018). After initially opposing the M-Pesa services, banks eventually embraced mobile money as a tool to provide financial services to the unbanked (Adams, 2011).

In 2011, the National Payment Systems Act (National Council for Law Reporting, 2011) was enacted which provided the CBK with oversight over mobile payment services. The Act consisted of a flexible framework for agency banking. The CBK adopted a functional approach to the oversight of mobile banking with both banks and non-banks, including mobile network operators, permitting them to provide mobile money services (Muthiora, 2015). These regulatory changes and amendments taken by the CBK created an enabling environment for agency banking and for mobile network operators. Regulatory and policy changes were also made in Tanzania in 2011/2 following the Kenyan approach, by deregulating mobile financial services and relaxing the regulations of MNO's and these changes have been credited with the high uptake of mobile banking adoption in Tanzania (Burns, 2018).

M-Pesa's financial services growth strategy relied on retail stores that sold airtime and mobile phones to provide services to the unbanked. This strategy resulted in M-Pesa becoming a powerhouse in mobile financial services (Wack, 2014). M-Pesa has since expanded to other networks and non-registered users, offering a variety of financial service features (Ondiege, 2015). In 2008, Vodafone for the first time

provided international remittances using M-Pesa by entering into an agreement with Western Union to allow remittances from the UK to Kenya (Bills, 2008). In 2009, farmers could purchase insurance against crop failure, rural communities could purchase safe water and could make microfinance repayments (Muthiora, 2015).

The M-Pesa facility became linked to formal bank accounts in 2010 through a partnership with the Equity Bank (Johnson & Arnold, 2012). This product, known as M-Kesho ("kesho" meaning tomorrow in Swahili), is a facility using the M-Pesa platform and agent network to offer more banking services to customers, such as interest-bearing accounts, loans and insurance (Kendall, Maurer, Machoka & Veniard, 2011). In 2012, M-Pesa launched another new product, M-Shwari ("shwari" meaning calm in Swahili), a savings and loan facility (Ondiege, 2015). In addition, by using M-Pesa, customers created data which could be used to underwrite small loans for consumers who did not have sufficient credit history (Crosman, 2015).

M-Pesa has been so successful that by 2015 it was estimated to have 20 million subscribers (Tshabalala, 2015) equating to 42% of Kenya's estimated population of 47.8 million (World Bank Group, 2019b). M-Pesa has provided access to a networked economy for all parts of the Kenyan population, from herdsmen, subsistence farmers, slum dwellers to urban dwellers (Pilling, 2016). Furthermore, M-Pesa has been described as a world leader in mobile money services (Burns, 2015). After approximately a decade of operation, nearly half of Kenya's Gross Domestic Product (GDP) flows through M-Pesa (Clozel, 2017). This success took place during the mid-2000s when many countries launched mobile money operations but only a handful achieved explosive growth, with the majority of mobile money schemes failing to ignite (Evans & Pirchio, 2014).

M-Pesa has had a positive impact on financial inclusion by reducing the number of unbanked individuals. According to the Global Financial Inclusion (Findex) database, the number of adults (aged 15 years or over) who have access to a bank account in Kenya has grown from an estimated 42% in 2011, to 75% in 2014 and to 82% in 2017 (Demirgüç-Kunt *et al.,* 2015, 2018; Demirgüç-Kunt & Klapper, 2012b). In terms of adults with bank accounts, Mauritius is the leading country in Africa with 90%, followed by Kenya with 82% as per the 2017 Global Findex Survey (Demirgüç-Kunt *et al.,* 2018). In Kenya, this is mainly due to the successful use of mobile banking.

To sum up, since the mid-2000s, the potential for technology to address financial exclusion has been recognised by global agencies such as the World Bank and the UN. Mobile technologies are now providing basic financial services for the poor and underbanked, especially in emerging economies. In the case of

M-Pesa, the idea to address financial services through mobile services first arose in early 2003, and after receiving funding and further product development, was officially launched in 2007. This evidences that it took a long period of time for the development of the technology used for mobile financial services. Furthermore, the state (both the UK and Kenyan governments) played an active role in the development of this technology. Firstly, the UK government called for proposals for innovations to be developed for the delivery of financial services through a challenge fund. Secondly, the UK government provided a significant capital contribution to fund the development of technology whilst also accepting the associated risks of the potential failure of this new technology. Thirdly, the Kenyan government adopted a bold risk-based approach to the regulation of mobile financial services. This approach allowed the innovation to occur (through a test-and-learn approach) without being constrained by regulations and provided an enabling regulatory environment for this technology to flourish.

5. Conclusion

By documenting the development of financial inclusion efforts from the early 1960s, this paper examined the role of the state in the development of technology used to address financial inclusion, and specifically, the use of mobile banking. The findings suggest the length of time behind these technological innovations. From as early 2004, mobile technology solutions have been developed to address financial inclusion. These solutions were part of a collaborative effort of various role players, ranging from social activists, governments, non-governmental organisations and public-private partnerships. The findings of this paper are in contrast to the view that the private sector alone has been spearheading disruptive technological innovations to address financial inclusion. This paper sheds light the role of the state in shaping and directing technological change in financial services, especially in the delivery of financial services to the previously unbanked.

This has been the case with M-Pesa in Kenya, which has since become a world leader in mobile payment services. The state was an entrepreneurial force behind the development of the technology used to address financial inclusion. The idea behind the M-Pesa project was inspired by the Millennium Development Goals to halve poverty by 2015. In response to a public sector challenge fund, it sought to find innovative ways to improve access to financial services. As research and development of technology are both risky and often take years to develop, projects typically have to compete for funding within a company. With a challenge fund, the company is able to overcome this hurdle, with half of the funding

coming from the outside provider and the other half matched by the company. The public sector challenge fund seeks propositions that are innovative and pro-poor and can instigate transformational changes such as the M-Pesa project.

The M-Pesa project demonstrates that commercially viable, “pro-poor products” (i.e. for-profit activities aimed at poverty alleviation) can be developed and are able to service low-income markets. The UK Department for International Development has been hailed as the pioneer of challenge funds (Foley, 1999; KPMG, 2012) while the World Bank has recognised the role that challenge funds play in developing transformational banking technologies (Ali & Phillips, 2017). M-Pesa, which began as a pilot project funded by a challenge fund, has evolved into providing financial services to the majority of the Kenyan population – not only transforming financial inclusion in the country but also influencing financial inclusion policies around the world.

Evidence documented in this paper highlighted the role of the Central Bank of Kenya in creating a conducive regulatory environment for this technology to thrive. Unlike the many mobile money schemes around the world that have failed, M-Pesa has experienced exponential growth – largely because the innovation was not constrained by the regulatory environment. The regulatory environment allowed for both banks and non-banks to provide financial services through correspondence (agent) banking. The simplicity of mobile banking services and the availability of agent networks to cash in and cash out of the system also contributed significantly to the high uptake of these services. A fundamental difference between the high uptake of mobile banking services experienced in Kenya and other countries in Africa is due to Kenyan banks and non-banks being able to provide mobile financial services, unlike the regulations in other parts of Africa. Further research into other mobile payment systems can increase the understanding of policies and funding requirements that enhance the uptake of mobile banking by the unbanked.

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