

The factors that create a successful mobile money ecosystem: Kenya vs Nigeria

A Dissertation

presented to

The **Development Finance Centre (DEFIC)**,
Graduate School of Business
University of Cape Town

In partial fulfilment
of the requirements for the degree of
Master of Commerce in Development Finance

by

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December 2017

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Abstract

This study set out to investigate factors affecting the adoption of mobile money services in Kenya and Nigeria. Using various models such as; the Technology Acceptance Model (TAM), Unified Technology Acceptance User Theory (UTAUT), Innovation Diffusion Process and demographic variables (age, sex, education level, access bank account, ownership of mobile phone, MM awareness) from datasets produced by Financial Inclusion Insights. This survey data is nationally representative for Nigeria with a sample of 6,001 adults aged 15 or older, both male and female and Kenya with a sample of 2,994 adults aged 15 or older, both male and female. The study employed the probit and logit regression model to examine the significant determining factors of mobile money adoption in Kenya and Nigeria.

The results of the analysis revealed that the average respondent of the populations in both markets has access to a mobile phone and hence technology is not a limiting factor to the penetration of Mobile Money in both these markets. The primary limiting factor is due to low levels of financial education, literacy and access to microfinance. The average Nigerian respondent did not know about Mobile Money whereas the average Kenyan respondent knew something about Mobile Money. Additionally, in Kenya, the MM initiative was privately led by MNO's where in Nigeria the Central Bank controls the MM industry. From the logit and probit results, the study identifies that the following variables; (FF1) personally registered a bank account, (MM1) has the respondent heard of Mobile Money were significant determinants of MMU in Nigeria. While in Kenya; (DG1) age of respondent, (MM1) has the respondent heard of something called mobile money, (FF1) personally registered bank account were the significant determining factors affecting MMU.

This study has therefore shown that, despite the lower penetration and absorption of mobile money services in Nigeria, factors that create a thriving MM ecosystem like that in Kenya are obtainable in Nigeria. If the Nigerian regulators were to change the political and financial framework and create a more accessible market Nigeria could look a lot like Kenya's MM ecosystem.

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Abbreviations

MM- Mobile Money

GDP- Gross Domestic Product

NCB- Nigerian Central Bank

MNO- Mobile Network Operator

SMS- Short Message Service

TAM- Technology Acceptance Model

TTF- Task-Technology Fit

UTUAT- Unified Theory of Acceptance and use of Technology

DOI- Diffusion of Innovation

SME- Small, Medium Enterprise

BOP- Base of Pyramid

KYC- Know your customer

Acknowledgement

I would like to thank my supervisor Dr Latif Alhassan, Candice Marais, and Tarin Cupido for their patience and kindness in helping me to complete my Master of Commerce in Development Finance.

I would also like to thank:

Joan Finlay

Doug Finlay

Caroline Finlay

Paul Finlay

Mary Finlay

And

Kevin Finlay

HOOYAH!!!

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Financial inclusion is identified as an essential contributor to the overall development of societies. Financial inclusion creates better living conditions, higher levels of output, reduced socio-economic inequality, healthier and safer livelihood's, poverty reduction, empowerment of women, and greater employment opportunities (Ingenico Group, 2015; Mahendra Dev, 2006). The term 'financial inclusion' refers to "the access to formal financial services at an affordable cost for all members of an economy, favouring mainly low-income groups" (Diniz, Birochi, & Pozzebon, 2012, p. 1).

Financial exclusion manifests in environments where there is weak governance, fragile institutions and lack of infrastructure (banking, electricity, water, roads) creating inefficient economies and markets which are inaccessible (Bhan, 2014; Rao, 2003). The dawn of the mobile phone created an opportunity for the financially excluded to become financially included, mobile money via the mobile phone is the platform which allows such a leap (Andrianaivo & Kpodar, 2011, 2012; Bhan, 2014; Demombynes & Thegeya, 2012; Lal & Shadev, 2015; Mas & Radcliffe, 2011). With a mobile phone and a mobile money account an individual is now able to perform a plethora of complicated financial transactions without the need for a formal bank account. From 2012 to 2016 Africa has had the fastest growing mobile phone market with 329 million subscribers and a market penetration rate of 38%. This increase in mobile telephony is far greater than anywhere else on the planet (Olsen, 2008).

Such an exciting business opportunity has spurred the introduction of more than 150 mobile money operators to start up shop on the continent (Bhan, 2014; Douglas, 2014; Lal & Shadev, 2015; Robb, 2015). Despite the tremendous business opportunity for Mobile Money in Africa, many of these companies are finding it difficult to remain profitable due to the unforeseen externalities associated with operating in Africa (Lal & Shadev, 2015). Of the few mobile money companies (many of which are MNO's) that are successful started off with a very simple platform with simple functionality: remittances, money transfer (person-to-person) and savings facilities. As adoption and user acceptance increased so has functionality with the introduction of services such as micro loans, insurance (health, property, agriculture), and other business type transactions (Donovan, 2012; GMSA, 2014).

This study used data from Intermedia's Financial Inclusion dataset for Nigeria and Kenya. The data was collected by conducting face to face interviews. In Nigeria 6001 surveys were conducted and in Kenya 2994 surveys were conducted each lasting on average 57 minutes.

The variables examined are; consumer preference, demographics and livelihood, technology and regulatory environment. The study will employ a comparative analytical approach on the selected variables including a binary regression and probit and logit models to determine the significance of mobile money usage (MMU).

1.2 Problem statement

Mobile money usage (MMU) has gained acceptance from consumers due to their desire for financial inclusion and the benefits accompanied by this including lowering the cost and risk associated with using alternative payment services to cash (Bhan, 2014).

While Africa is replete for mobile banking services, mobile money (MM) has had scattered success in each country, demonstrating that mobile money marketplace requires a specific type of ecosystem to be viable Factors that make up this ecosystem include:

- (i) **technology** allowing for the platform to be hosted via mobile devices;
- (ii) **regulatory environment** such as; "transparency, acceptend means of payment by parties other than the issuer, electronically recorded, available to a user to conduct financial transactions through a mobile device, redeemable for cash" (GSMA, 2015)
- (iii) **consumer preferences** such as; "financial literacy of the users, the strategy to drive user adoption; and a need of the customer for the service" (Ingenico Group, 2015; Lal & Shadev, 2015).
- (iv) **demographics & livelihood** of the MM user; age, sex and the highest level of education

In an attempt to maintain efficient and prudent business practices many MM establishments deployed a standardized business model to cover the whole of the continent. Unfortunately, there is very little about Africa that is homogenous the continent is rather one of many complexities, market nuances and vast cultural differences that must be accounted for when offering various business services (Lal & Shadev, 2015). Rapid growth in the telecommunication space is fueled by the demand for mobile devices. In 2014, 38% of the continents populations owned a mobile device (Olsen, 2008), it is thus safe to assume that the technology, a critical element of MM, has created the potential for a conducive MM ecosystem. However, consumer

preferences, demographics and livelihood, and the regulatory environment are also critical elements in the ecosystem that differ quite drastically. As we have seen with the success of MM services in countries like: Kenya, Tanzania and Uganda while we have also see failures in South Africa, Nigeria and the Democratic Republic of Congo (Financial Inclusion Insights, 2015). At 30,000 feet Kenya and Nigeria appear to be similar markets however, a more detailed analysis reveals that 75% of Kenya’s population are registered MM users whereas, less than 1% of Nigeria’s population are registered MM users (Financial Inclusion Insights, 2015).

This study aims to identify that MM requires a specific set of variables to be present to create a thriving MM ecosystem. Using specific factors: consumer preference, demographics and livelihood, regulatory environment and technology this research will isolate the variables responsible for the extreme differences in MMU between the two countries.

1.3 Research question

This research aims to identify what accounts for the vast differential in the usage of mobile money in Kenya and Nigeria?

1.4 Research objectives and hypothesis statement

The research objectives this study seeks to achieve the following;

- To identify and isolate the significant variables responsible for MMU in Kenya and Nigeria
 - demographics and livelihood
 - technology
 - regulatory environment and
 - consumer preference

1.5 Hypothesis statement

-
- The null hypothesis H_0 is: The following factors are not significant regarding the consumers choice to partake in MM services; technology, regulatory environment, consumer preference and demographics and livelihood.
 - The alternative hypothesis is, therefore: The following factors are significant regarding a consumer's choice to partake in MM services; variables for technology, regulatory environment, consumer preference, demographics and livelihood.

1.6 Justification for the study

It has taken six decades for the first country in Africa to obtain liberation from colonial rule with many other African countries following suit, yet many of these nations remain 3rd world economies. Thus, the argument that development in Africa has not occurred on a significant scale is quite evident. One of the main inhibitors to development has been the lack of financial inclusion. "Financial inclusion is an essential aspect of progress in improving the living conditions of vulnerable groups and encouraging more exceptional contributions to the overall economy" (Ingenico Group, 2015; Mahendra Dev, 2006). For an economy to develop critical infrastructure needs to be in place to efficiently process financial transactions stimulating increased productivity. With the introduction of the mobile phone and the infrastructure that supports mobile telephony, a new platform for inclusion has been made available to African markets. Mobile phones remove the need for governments and commercial entities to provide costly financial infrastructure thus leaping into a new era of development where many more can become financially included. This is no more evidenced than with the triumph of M-Pesa, a form of mobile money, in markets such as Kenya, Tanzania and Uganda. However, mobile money has failed in many other African markets, such as Nigeria and South Africa. This study aims to identify the variables causing these outcomes.

With the success of M-Pesa in Kenya, many companies have struggled to copy the M-Pesa model throughout Africa. This research seeks to provide a better understanding to stakeholders as to why there have been varying degrees of success so that policymakers, MNO's and regulators can address these barriers. Creating a better environment where mobile devices can act as a conduit to financial inclusion, particularly in the markets where MM uptake has been reduced. If stakeholders can better understand the reasons why MM technology is not utilised by the

majority of the respective countries populous they can then start to shape an environment that is more conducive to inclusion.

1.7 Organization of the Thesis

The structure of the thesis is in the following format. The second chapter is the Literature review, which highlights the topics of the study; 1a brief overview of the two markets in question, as well as, an analysis of the theoretical and empirical contributions to the research topic. Chapter three discusses the methodology behind the research. It speaks to the comparative study conducted, the data sources, collection and sampling and gives the foundation for the analytical framework used. Furthermore, this chapter provides a detailed description and theoretical description of the selected variables, used for this study. Chapter four is the discussion of the findings. It showcases the descriptive statistics, correlation analysis, regression results, mode diagnostics, significance tests and diagnostics tests for Kenya and Nigeria. Finally, chapter five concludes with a summary of findings within the thesis and recommendations for further research into the area of study.

1.8 Working Definitions

Mobile Banking - When customers access a bank account via a mobile phone; sometimes, they can initiate transactions (Gsma, 2010).

Mobile Wallet -An account that is primarily accessed using a mobile phone (Gsma, 2010).

Over-The-Air (OTA) Registration -A term used to describe creating a mobile money account for a customer via the mobile network and without the need to update any physical hardware in the phone (Gsma, 2010).

Liquidity -The ability of an agent to meet customers' demands to purchase (cash in) or sell (cash out) e-money. The key metric used to measure the liquidity of an agent is the sum of their e-money and cash balances (also known as their float balance) (Gsma, 2010).

Know Your Customer (KYC) - Rules related to AML/CFT which require providers to carry out procedures to identify a customer (Gsma, 2010).

Informal Financial Services-Financial services offered by unregulated entities. Examples of informal financial services are, i.e. collections in Kenya, loan-shark lending, savings groups, etc (Gsma, 2010).

E-Money -Short for "electronic money," is stored value held in the accounts of users, agents, and the provider of the mobile money service. Typically, the total value of e-money is mirrored in (a) bank account(s), such that even if the provider of the mobile money service were to fail, user (Gsma, 2010).

Agent -A person or business that is contracted to facilitate transactions for users. The most important of these are cash-in and cash-out (i.e. loading value into the mobile money system, and then converting it back out again); in many instances, agents register new customers too. Agents usually earn commissions for performing these services. They also often provide front-line customer service—such as teaching new users how to initiate transactions on their phone. Typically, agents will conduct other kinds of business in addition to mobile money. The kinds of individuals or businesses that can serve as agents will sometimes be limited by regulation, but small-scale traders, microfinance institutions, chain stores, and bank branches serve as agents in some markets. Some industry participants prefer the terms “merchant” or “retailer” to describe this person or business to avoid certain legal connotations of the term “agent” as it is used in other industries (Gsma, 2010).

Cash-In- The process by which a customer credits his account with cash. This is usually via an agent who takes the cash and credits the customer’s mobile money account (Gsma, 2010).

Cash-Out- The process by which a customer deducts cash from his mobile money account. This is usually via an agent who gives the customer cash in exchange for a transfer from the customer’s mobile money account (Gsma, 2010).

Float- The balance of e-money, or physical cash, or money in a bank account that an agent can immediately access to meet customer demands to purchase (cash in) or sell (cash out) electronic money (Gsma, 2010).

Access to banks – Counts individuals who have a full-service bank account registered in their name or report use of a full-service bank account that belongs to someone else.

Access to mobile money or an NBFi – Counts individuals who have ever used a mobile money service or a full-service NBFi account.

Active registered user – An individual who has an account registered in their name and has used it in the last 90 days.

Advanced active registered user – An active registered user who has ever used at least one advanced financial service.

Advanced DFS use – Advanced use of digital financial services includes activities beyond basic cash-in/cash-out and person-to-person transfers (e.g., savings, bill pay, investment, insurance).

Basic use – The use of an account to cash-in (deposit) or cash-out (withdraw), transfer money to another individual, or conduct account maintenance.

Below the poverty line – In this particular study, adults living on less than \$2.50 per day, as classified by

the Grameen Foundation's Progress out of Poverty Index.

Cooperative – Typically, a business or other professional organization that is owned and run jointly by its members, who share profits or benefits. Cooperatives may release some of the profits/funds as loans to its members.

Credit-only nonbank financial institutions – Financial institutions that only disburse loans to their customers.

Customer journey – An illustration of progressive stages through which consumers become more active users of more sophisticated financial services.

Digital financial services (DFS) – Financial services provided through an electronic platform (e.g., mobile phones, debit or credit electronic cards, internet).

Financial inclusion – Individuals who have an account with an institution that provides a full suite of financial services and comes under some form of government regulation. Services include savings, money transfers, insurance or investment. Institutions that only offer loans to consumers, such as some MFIs, are not considered to be full-service institutions.

Financial literacy - Basic knowledge of four fundamental concepts in financial decision-making (interest rates, interest compounding, inflation, and risk diversification) as measured by the Standard and Poor's Rating Service's Global Financial Literacy Survey.

Full-service financial institutions – Financial institutions that offer loans to their customers and at least one of the following additional services: savings, money transfers, insurance, or investments.

Grameen Progress out of Poverty Index (PPI) – A poverty measurement tool from the Grameen Foundation wherein a set of country-specific questions are used to compute the likelihood that a household is living below a specific income threshold.

A microfinance institution (MFI) – An organization that offers financial services to low-income populations. Almost all give loans to their members, and many offer insurance, deposit, and other services.

Mobile money (MM) – A service in which a mobile phone is used to access financial services.

Nonbank financial institution (NBFI) – A financial organization that is not formally licensed as a bank or a mobile money provider, but whose activities are regulated, at least to some extent, by the central bank within the country. Such financial institutions include microfinance institutions (MFI), cooperatives, Post Office (Savings) Banks and savings and credit cooperatives (SACCOs).

Numeracy - The ability to use basic math skills, including counting, addition, division, multiplication, and

computing short and long-term interest rates

Post Office (Savings) Bank – A bank that offers savings and money transfers and has branches at local post offices.

Registered user – Counts individuals who have a financial account registered in their name

Savings and credit cooperative (SACCO) – A unique member-driven, self-help group owned and managed by its members, who have a common bond. Its main purpose is to build up funds through regular contributions by each member, with the aim of providing affordable credit and collective investments for its members.

Unregistered/over-the-counter (OTC) user – An individual who has used DFS through someone else's account, including a mobile money agent's account or the account of a family member or a neighbour.

Urban/rural – Urban and rural persons are defined according to their residence in urban or rural areas as prescribed by the national bureau of statistics.

Value-added services- These are non-core financial services that go beyond the standard services provided by financial institutions.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents an overview of both the theoretical and empirical literature on the determinants of mobile money. It first defines the role of MM in the broad context of financial inclusion. Further covered in this chapter will be mobile money and financial inclusion which will cover the definition of concepts, an overview of the mobile money arena in Kenya and Nigeria, the adoption of mobile money, theoretical Framework and determinants of mobile money usage and a conclusion.

2.2 Financial Inclusion Definition of Concept

“Financial inclusion means that individuals and businesses have access to useful and affordable commercial products and services that meet their needs – transactions, payments, savings, credit, and insurance – delivered responsibly and sustainably” (The World Bank 2017). Thus, one of the most efficient facilitators of financial inclusion is mobile money: a service in which the mobile phone is used to access financial services (GSMA, 2010).

2.3 Mobile Money Definition of Concept

Mobile cash covers a vast scope of overlapping applications, and the definition varies by industry and by country. “In general, mobile money is a term describing the services that allow electronic money transactions over a mobile phone. Also referred to as mobile financial services, mobile wallet and mobile payment” (Ernst & Young, 2012). In this paper, we identify mobile money as any financial transaction enabled by the mobile phone. Over the years, a wide range of mobile money applications have emerged, the three most prominent of which are:

- (i) Mobile Banking- allows for account information, transactions, investments, loans, insurance, support and content services using the mobile phone.
- (ii) Mobile Transfer (Remittances)- is peer-to-peer transactions to send and receive money to friends, family or acquaintances.

(iii) Mobile Commerce- uses the mobile phone to facilitate financial transactions for the purchase of sales, retrieve promotional information or coupons, and deliver gift items (Ernst & Young, 2012).

2.4 Financial Inclusion & MM in Africa

It is widely believed that financial inclusion is one of the pillars of development and an essential component of a country's economic engine. Between 2000 and 2002 financial inclusion was a buzz word on the development scene. Then in 2011, the World Bank Group's introduced the Global Findex database (Demirguc-Kunt, Klapper, Singer, & Oudheusden, 2014) catapulting financial inclusion to the forefront of developmental topics. Since gaining traction 2000, financial inclusion has since amassed a tremendous amount of literature regarding its role in economic development and the advancement of people's lives for the better (Demirguc-Kunt, A. Klapper, 2012; Diniz et al., 2012; Ingenico Group, 2015; Mahendra Dev, 2006; Sarma & Pais, 2008).

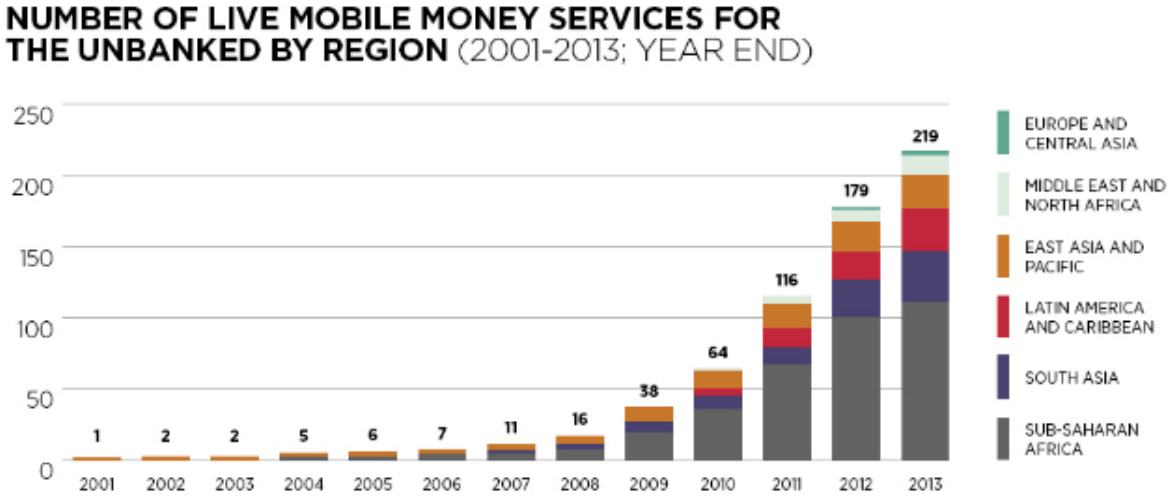
The technological advancement in mobile devices is astounding, users are now able to perform complicated tasks with a wide range of functionality. This increased functionality is expediting development and enabling financial inclusion (Chavula, 2013; Mas & Kumar, 2008; Olsen, 2008; Scott, Batchelor, Ridley, & Jorgensen, 2004). In 2007, M-Pesa proved the MM was not only viable but successful (Mas & Radcliffe, 2011). M-Pesa's success created a wave of interest in mobile money in the academic world - researchers began to examine the mobile platform as a conduit for additional financial services as well as a means to increase financial inclusion across the continent. (Bhan, 2014; Cheney, 2008; Demombynes & Thegeya, 2012; Dermish, Kneiding, Leishman, & Mas, 2011; Donovan, 2012; Duncombe & Boateng, 2009; Klein & Mayer, 2011; Scott et al., 2004). The excitement among researchers was soon stifled as it became clear that the necessary data on MM and mobile technology was not easily obtained. At the same time, it became apparent that reliable data on mobile technology and mobile money was not readily available. The lack of data on the MM market allowed for commercial enterprises such as Financial Inclusion Insights (FII) and GSMA to act as an unbiased source of reliable information.

The GSMA offers analytical tools and reporting, case studies, research funding, and real-time mobile telephony data (GSMA, 2015a). Reports such as the "State of the mobile industry focusing on financial services of the unbanked"(GSMA, 2010), and the Mobile economy in sub-Saharan Africa (GSMA, 2015b). Thus companies like GSMA and FII are now providing researchers

the non partisan data necessary to study ways in which MM and mobile technology can advance development and financial inclusion (Microfinance Information Exchange, 2015).

Reliable datasets from companies like FII, GSMA, Intermedia and FINclusion lab, has allowed from an abundance of research on MMU, the varying factors effecting MMU and determinant for the use of MM.

FIGURE 1:
NUMBER OF LIVE MOBILE MONEY SERVICES FOR THE UNBANKED BY REGION



Source: (GSMA, 2015b)

In 2006, the first MM service was offered in Sub-Saharan Africa, only recently have researchers begun to examine the determinants of uptake and user acceptance. Duncombe & Boateng (2009) identified there was a gap being ignored by most research. They determined that further research needs to be focused on the space where mobile phones and financial services met: mobile banking.

Burdee & Williams (2013), Lal & Shadev (2015) and Yawe (2015) examined the success of MM in Africa using a similar approach and methodology as the one used in this study. Budree & Williams (2013) commenced a case study into the reasons why M-PESA was not as successful in South Africa as it was in Kenya. By applying qualitative techniques from existing records they determined that two notable factors had a negative or positive effect on MMU: (i) education and

(ii) ease of accessibility (distance to MM agent). If the consumer was educated they had an easier time comprehending the transaction and if the MM agent was easily accessible to consumers, they would be more likely to use the service.

Lal & Shadev (2015) began a qualitative study examining five successful MM companies and particularly interested in the design of MM services as a means for viable business transactions to determine if MM could be expanded to function as a day to day business tool. The results indicated the MM could be expanded to better service SME's for day to day business transactions Yawe, (2015) used FII dataset from 2013 to initiate a quantitative to examine the MM markets in; Bangladesh, India, Nigeria, Pakistan, Tanzania, and Uganda. Yawe (2015) aimed to identify the variable needed for acceptance of mobile technology, MM, and financial services. This study will compare these relationships in Kenya and Nigeria.

2.5 Overview of Mobile Money: The case of Kenya and Nigeria

This section presents a high-level comparison of Kenya and Nigeria's financial services sector and which modalities are most used by the local populations. This study will look at both country's mobile money markets, financial services usage by the community, mobile money uptake and financial service awareness (including mobile money) by state. It is a cross-sectional view, which will highlight the stark differences and similarities between the two markets.

TABLE 1:

CROSS COUNTRY COMPARISON: FINANCIAL SERVICES IN KENYA AND NIGERIA

	KENYA	NIGERIA
Market Access & Availability		
DFS Market Stage	Consolidation	Early Start-Up
Market Characterization	Oversaturated with decreasing profits for all players	Lacking digital inclusion across the country; Political instability fuels market insecurity
Infrastructure		
% of country with electricity	23%	48%
Top mobile networks	Safaricom, Airtel, Orange	MTN, Airtel, Glo Mobile, Etisalat, Multi-Links
No. of mobile money providers	4	12
Commercial bank branches per 100,000 adults (2013)	5.6	6
Consumer Dynamics		
Below poverty	51%	91%
Not Advanced beyond primary education	52%	21%
Mobile phone ownership	74%	88%
Own a bank account or Mobile money account	65%	43%
Own NBFi account	8%	6%
Gender		
Men	35%	49%
Women lag in all indicators	-15	-13
Women	20%	36%
Technological Literacy	75%	80%
The Next Challenge	Convincing mobile money users to access advanced services	Re-introducing mobile money as a better solution for inclusion

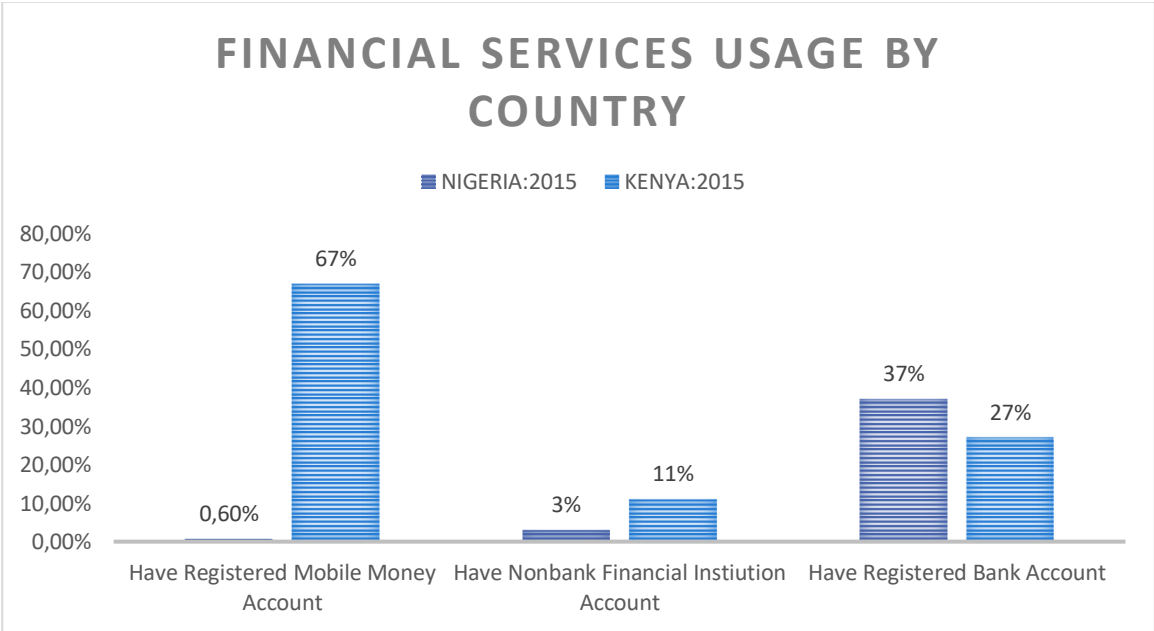
Source: (Inter Media, 2014a, 2014b) *Intermedia FII-Event-May-7-Cross-Country-Comparison 2015*

Kenya and Nigeria are in entirely different growth cycles; Kenya’s mobile money market is mature and facing saturation among its most substantial players and has been relatively stable politically and economically. Nigeria is still in the start-up phase of MM, met with political turmoil, and a crashing currency due to the decline in oil prices. Nigeria also is battling two forms of domestic terrorism, (i) rebel groups in the oil delta, which disrupt oil operations through strategic strikes, and (ii) in the North East, the government has been waging a multi-year war with Boko-Haram. Kenya and Nigeria face very different externalities thus characterising each of the markets differently. While Nigeria is a far more difficult environment by all measurements, it is significant that 48% of the Nigerian population has access to electricity with 12 mobile money operators compared to Kenya’s access to power, which is only 23% and just has four

mobile money operators. It highly probable that Kenya has fewer mobile money operators due to the phase of growth which they are currently in, namely the consolidation phase of development. Five years ago, the number of mobile money operators in Kenya was around that of Nigeria's: 12. The difference of 25% in access to electricity compared to Kenya is most likely due to the difference in population densities around the major cities. The last notable comparison is illustrated in Table 1 where the percent of the population living below the poverty line is presented, Nigeria sits at 91% while Kenya is 51%.

Figure 2:

FINANCIAL SERVICES USAGE BY COUNTRY

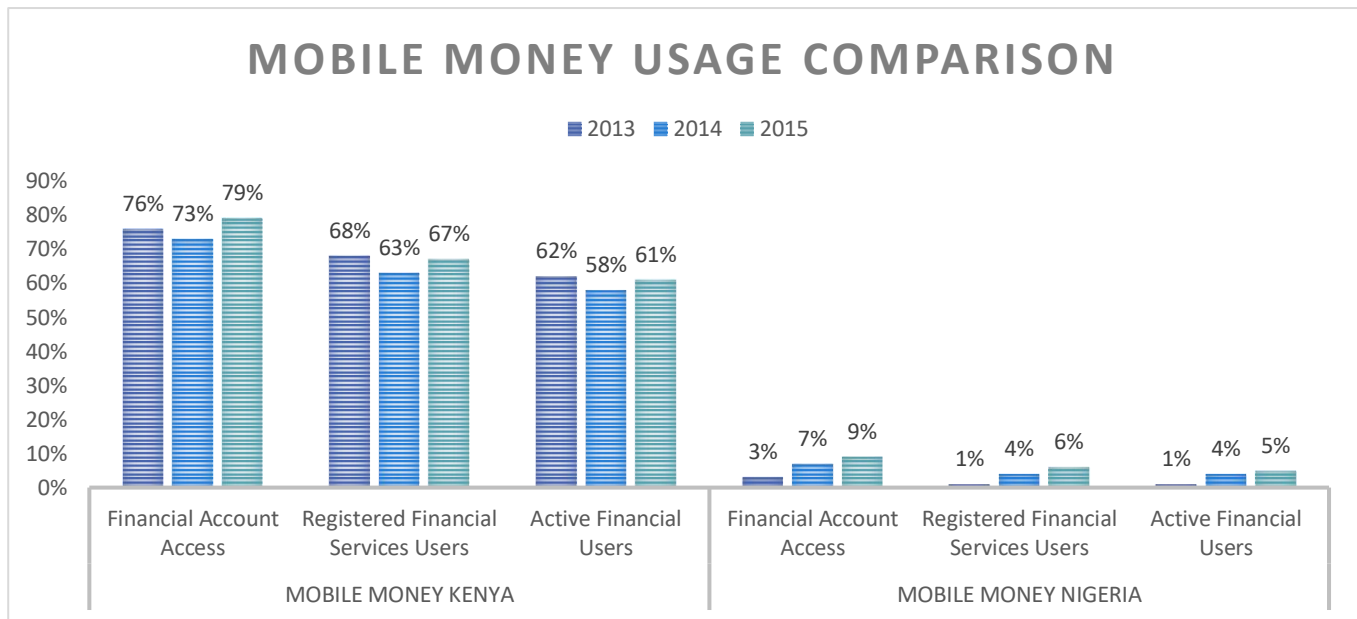


Source: (InterMedia, 2014b) *Intermedia Nigeria FII Tracker survey Wave 3 (N=6,001,15+) 2015*

Error! Reference source not found. compares the types of financial services used in Nigeria and Kenya in 2015. In Kenya, mobile money usage surpasses both registered bank accounts, and non-bank financial institution accounts for more than double. It is highly likely that the Kenyan consumer would be more likely to know the location of an MM agent or kiosk versus an ATM or other regulated financial institution. Comparatively, in Nigeria, less than one percent of the population has attempted to use mobile money, if they did, it was to either receive a remittance or to test the technology for themselves. With a population of 182 million people, only 12 percent of Nigerians are aware that Mobile Money services exist.

FIGURE 3:

MOBILE MONEY USAGE, BY COUNTRY

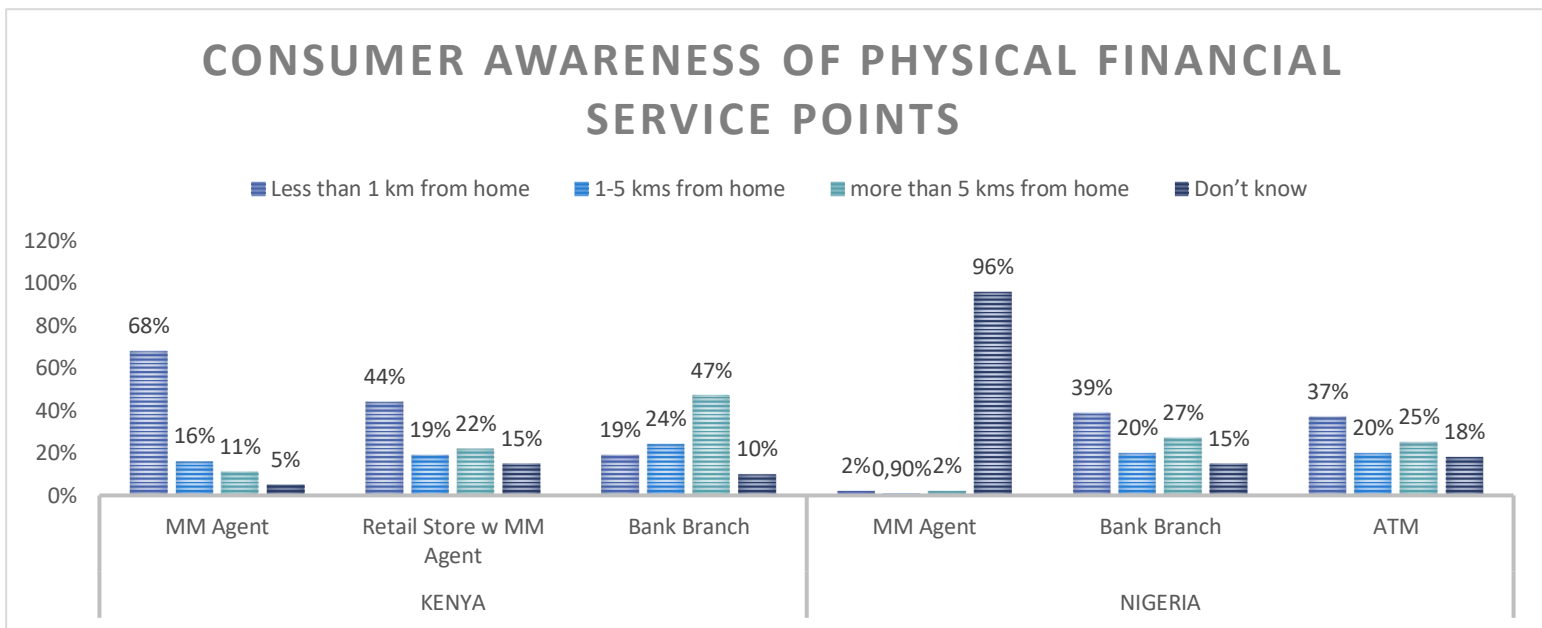


Source: Intermedia Kenya FII Tracker survey Wave 1 (N=3,000, 15+), September-October 2013; Wave 2 (N=2,995, 15+), September 2014; Wave 3 (N=2,994, 15+), September 2015. Intermedia Nigeria FII Tracker Surveys Wave 1 (N=6,002, 15+), September-December 2013; Wave 2 (N=6,000, 15+), June-September 2014; Wave 3 (N=6,001, 15+), August-September 2015.

Error! Reference source not found. compares Mobile Money usage in Kenya and Nigeria from 2013, 2014, and 2015 by access, registered users and active users. In 2014, Kenya saw a brief decline in mobile money usage. However, 2015 usage figures are recovering to levels seen in 2013. Mobile money continues to be ubiquitous in Kenya with 8 in 10 adults actively using the service. Nigeria shows continued growth from 2013-2015 across the categories, however; uptake is still paltry compared to Kenya. In 2015, only two in five Nigerians had a formal financial account, and less than one percent have a mobile money account. Lack of awareness and education around the product are the most prominent barriers; it will take a concerted rebranding effort to increase usage substantially.

FIGURE 4:

CONSUMER AWARENESS OF PHYSICAL, FINANCIAL SERVICE POINTS



Source: Intermedia Kenya FII Tracker Survey Wave 3 (N=2,994, 15+), September 2015. Intermedia Nigeria FII Tracker Survey Wave 3 (N=6,001, 15+), August-September 2015.

Error! Reference source not found. is the combined result of a survey done by (InterMedia, 2014a, 2014b) that illustrates the distance that consumers in Nigeria and Kenya live from a physical, financial service point. For this survey “service points” represent: a mobile money agent, a retail store with a mobile money agent or bank branch or an ATM. In Kenya, 68% of respondents said they live within 1 kilometre of a mobile money agent where only 19% said they live within 1 kilometre from a bank branch. This statistic illustrates the mobile money saturation in Kenya, 7 in 10 adults live closer to an MM agent that they do a traditional bank branch. the success of mobile money in Kenya is very likely due to its convenience factor. While, in Nigeria, the MM Agent is almost non-existent, with 96% of the respondents reported that they did not even know where to find an MM Agent. In Nigeria, only 39% of respondent reported that they live within 1 kilometre of a bank branch and 37% reported that they live within 1 kilometre of an ATM. This indicates that physical access, or lack thereof, to a financial institution of any kind is a product of poor infrastructure and overpopulation. 15% of the sample population reported they “don’t know” the location of a bank branch and 18% reported they “don’t know” where to find an ATM. These statistics highlight the overwhelming challenge facing Nigeria to “financially include” the majority of its population.

2.6 Mobile Money Adoption: Theoretical Framework

2.6.1. Financial Inclusion

The unbanked are those who do not have a bank account or another account with a traditional financial institution, whereas the underbanked are considered those who have constrained access or utilisation of conventional banking accommodations (Federal Deposit Corporation, 2003). Without the means to access a financial facility how does one protect his or her assets? Those who do not have a bank account often resort to jeopardous measures, such as hoarding cash or holding their assets in commodities like gold or other precious natural minerals according to Asli Demirguc-Kunt, the director of development policy and director of research at the World Bank (2012). Leora Klapper, also from the World Bank, accentuated the paramountcy of inclusive financial systems:

"Well-functioning financial systems serve a vital purpose, offering savings, credit, payment, and risk management products to people with a wide range of needs. Inclusive financial systems—allowing broad access to financial services, without price or non-price barriers to their use—are especially likely to benefit poor people and other disadvantaged groups. Without inclusive financial systems, poor people must rely on their limited savings to invest in their education or become entrepreneurs—and small enterprises must rely on their limited earnings to pursue promising growth opportunities. This can contribute to persistent income inequality and slower economic growth." (Demirguc-Kunt, A. Klapper, 2012, p. 1).

The importance of the financial services industry in a countries economy and society is studied by a plethora of scholars and researchers. There are three pillars in which each attempts to justify the importance of an inclusive financial economy, according to (Beck, T. Demirguc-Kunt, A. Peria, 2005).

Beck, T. Demirguc-Kunt, A. Peria (2005) found a correlation between the degrees of maturity in countries financial system and the level of economic development. This means that the more

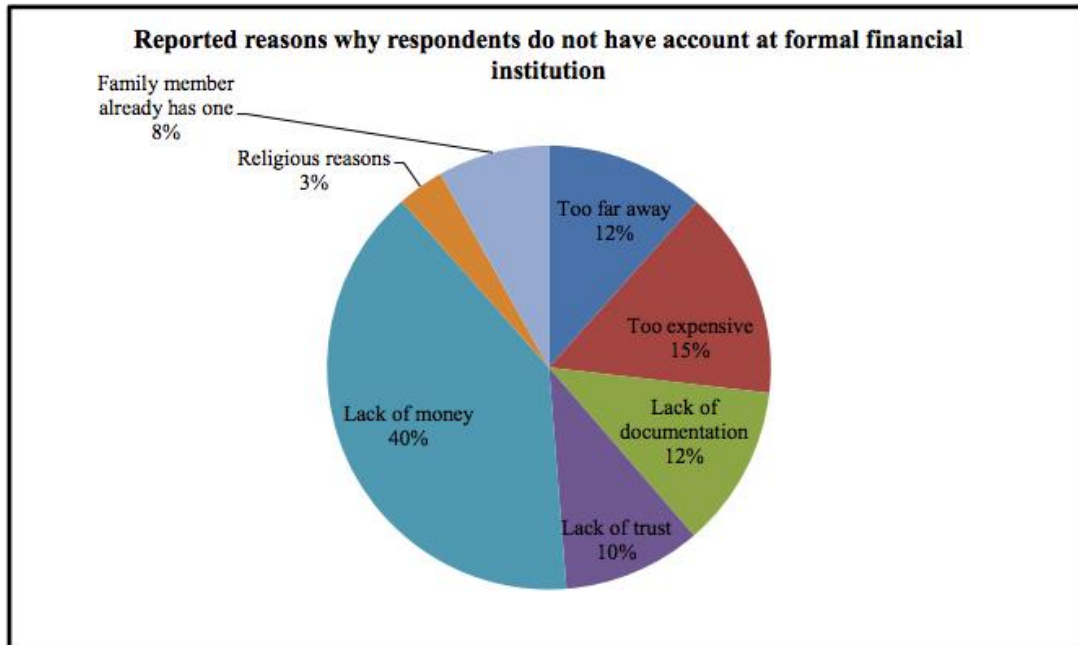
mature the financial services industry, the higher industrial output of the nation. The results of the empirical study concluded there is a significant positive relationship concerning banking access and positive monetary development. Another significant conclusion found by Beck, T. Demirguc-Kunt, A. Peria (2005) was that countries which had better-developed infrastructure such as, telecommunications, roadways, public services, and electrification, allowed for the financial services sector to have significantly higher outreach. It would appear that there is a correlation between infrastructure and customer inclusion.

In Beck, T. Demirguc-Kunt, A. Peria's (2005) second argument asserted was that an equal and competitive economic marketplace was needed for inclusion to blossom. This point is mainly hypothetical, but again it lends itself to the importance of point 1, which developed financial institutions produce better overall economic output for the nation.

The last argument is that access to financial services is a sociopolitical and moral necessity of the state. The researchers suggest financial inclusion is just as necessary as the World Bank's Millennium Development Goals, which include: eradicate extreme poverty and hunger, universal primary education, promote gender equality and empower women, reduce child mortality, improve maternal health, combat HIV/AIDS malaria and other diseases and ensure environmental sustainability (*World Bank Development Indicators*, 2012). As research shows, financial inclusion can be a major factor in achieving some of these goals. The World Bank Findex survey below gives an idea as to why the respondents did not have an account at a formal bank.

FIGURE 5:

REPORTED REASONS WHY RESPONDENTS DO NOT HAVE ACCOUNTS AT FORMAL FINANCIAL INSTITUTION



Error! Reference source not found.: supports the three arguments made by (Beck, T. Demirguc-Kunt, A. Peria, 2005).

2.6.2. MOBILE MONEY

"Never before in history has innovation offered the promise of so much to so many in so short a time." – Bill Gates

Through technology it is possible to remove the barriers which hinder financial inclusion with the mobile phone as the lynchpin of the process. A large portion of Africa's population (Ifc, 2011) have a mobile device which, has potential to facilitate financial access through the use of Mobile Money. Countries with weak financial services infrastructure and large populations of unbanked and underbanked can extend banking services with MNO's and mobile banking (Demirguc-Kunt & Klapper, 2012; Klapper, 2012). The term "mobile banking" refers to the act of acquiring bank account information know your customer (KYC) or performing banking transactions on a mobile device. According to the US Federal Reserve report "Mobile banking and mobile payments have the potential to expand financial services to the unbanked by reducing transaction costs and

increasing the accessibility of financial products and services." (Consumers and Mobile Financial Services, 2013). Mobile banking started with SMS (short message service), which uses standardised communication protocols to enable mobile phone devices to exchange short text messages. So, with the ability of SMS technology banks were able to identify ways in which customers could perform simple tasks or transactions, such as account balances, transfers, account updates, change passwords and request credit reports. Today smartphones allow customers to conduct complicated transactions using the devices ability to access the Internet wirelessly.

The question as to why some technologies are accepted and others rejected has captured the attention of many researchers. Many theories on the topic of technology adoption have been developed and tested for example;

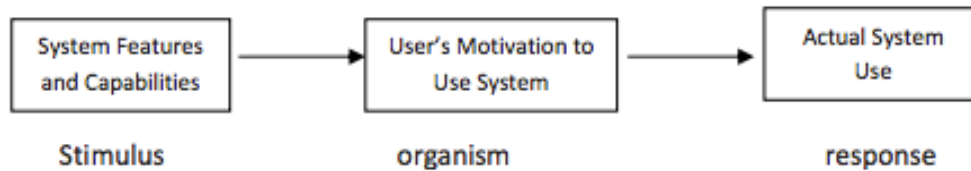
- Task-Technology Fit theory (Goodhue, 1995);
- Technology Acceptance Model (TAM) (Davis, 1898);
- Innovation Diffusion theory (IDT) (Rogers, 2003); and
- Unified Technology Acceptance User theory (UTAUT) by (Venkatesh, Morris, Davis, & Davis, 2003b).

2.7 Technology Acceptance Model (TAM)

Around the 1970's, companies started to rely more and more on technology to remain competitive and increase efficiency, however, the IT systems proposed by organisations were not achieving the user adoption rates anticipated. The lack of user adoption created a research area of interest where several key findings were made including the. theory of Technology Acceptance Model (Davis, 1898). This model stated that system use directly correlated with user motivation which derived from the external stimulus comprising the features and capabilities of the actual system. Today this is referred to as UI or user interface. The figure below highlights how (Davis, 1898) TAM model justifies system use.

FIGURE 6:

CONCEPTUAL MODEL FOR TECHNOLOGY ACCEPTANCE

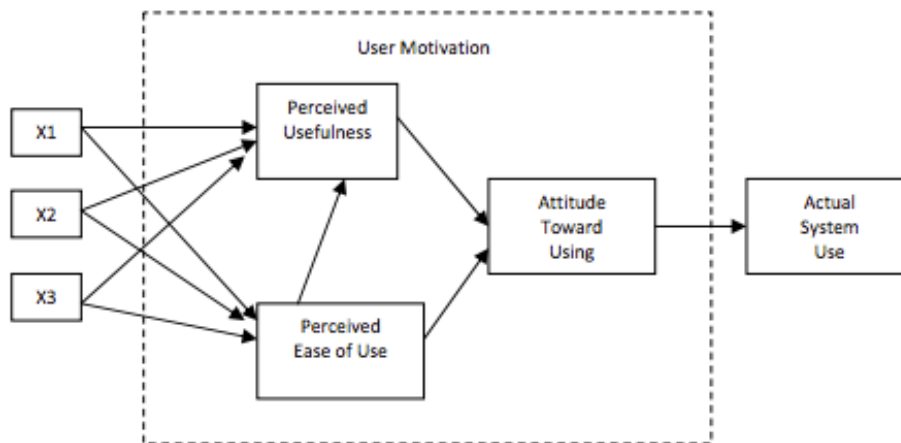


Source: Davis, 1985, p.10

Using the foundation of a study conducted by (Fishbein, M., Ajzen, 1975), in the theory of Reasoned Action, (Davis, 1898), continued to improve TAM as seen below.

FIGURE 7:

REFINED MODEL FOR TECHNOLOGICAL ACCEPTANCE



Source: Davis 1986, p 24.

Error! Reference source not found. implies that three variable's (X1, X2, X3) influence a users' motivation; the attitude towards using, perceived ease of use and perceived usefulness (Davis, 1898). Davis postulates that the attitude towards using a system is the greatest determining

factor as to whether the user would adopt or refuse the proposed system. In this model, the user's attitude was influenced by two variables: the perceived ease of use and the perceived usefulness, the perceived ease of use directly correlated to the perceived usefulness. On the left of the figure are three boxes labelled X1, X2, and X3, in Davis' model these represent the design characteristics of the system, so if these were perceived to be user-friendly and helpful the user adoption rate would be high.

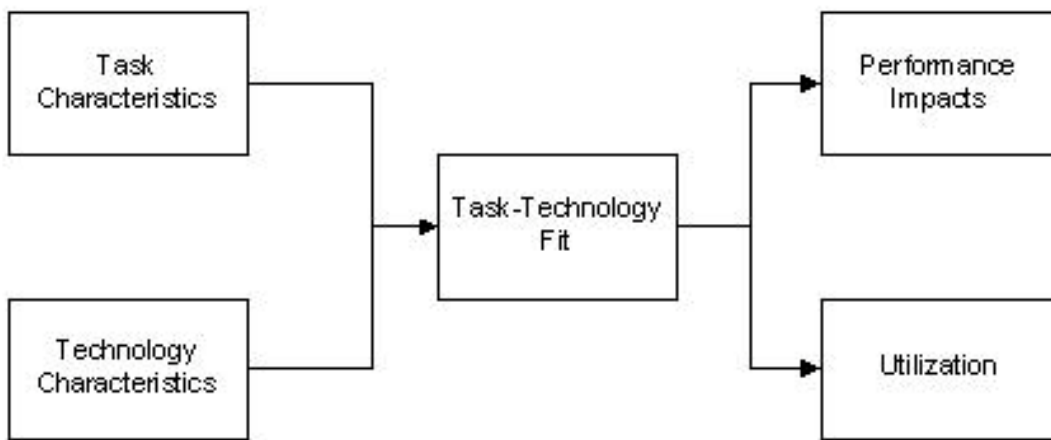
As the TAM model gained popularity, Davis continued to refine his model to account for additional variables that also played an essential role in the relationship between user and adoption. Relatedly, many proposed additions to Davis' model were accepted making TAM the most widely accepted theory about the prediction of system use. Moreover, TAM is so popular that it is cited in most literature that deals with user technology adoption (Lee, Y., Kozar, K.A., Larsen, 2003). Lee, Kozar & Larsen (2003) also argue that TAM's popularity may also be distracting, as a great deal of attention was given to TAM because it was quick and easy research diverting attention from the real problem of technology acceptance. Technology is advancing at an unprecedented pace, and the verdict regarding user acceptance is still not out. However, it is important to understand the strengths and limitations of the TAM model for anyone studying user technology acceptance. TAM has proved to be the useful paradigm (Amin, H., Supinah, R., Aris, M. M., & Baba, 2012; Lule, I., Omwansa, T. K., & Waema, 2012; Mbogo, 2010; Odia, 2012; Tobbin, 2011; Venkatesh, Morris, Davis, & Davis, 2003a). In some cases, TAM is used in conjunction with other theories. For instance, Pousttchi, K., & Wiedemann (2007) combined the Technology Acceptance Model with Task-Technology Fit to examine how these approaches played a role in consumer acceptance of mobile money payment in Africa.

2.8 Task-Technology Fit Theory

The Task-Technology Fit theory (TTF) states "technology is more likely to have a positive impact on individual performance and be used if the capabilities of the IT match the tasks that the user must perform" (Goodhue, 1995). The TTF theory uses a system of eight variables to measure the overall measure of the technology: authorisation, ease of use/training, production timeliness, system reliability, quality, locatability, compatibility and relationship with users. Each variable is

measured using a range of two and ten questions with responses on a seven-point scale ranging from strongly disagree to agree (Goodhue, 1998) strongly.

FIGURE 8:
TASK -TECHNOLOGY FIT DIAGRAM



Source: Goodhue and Thompson (1995)

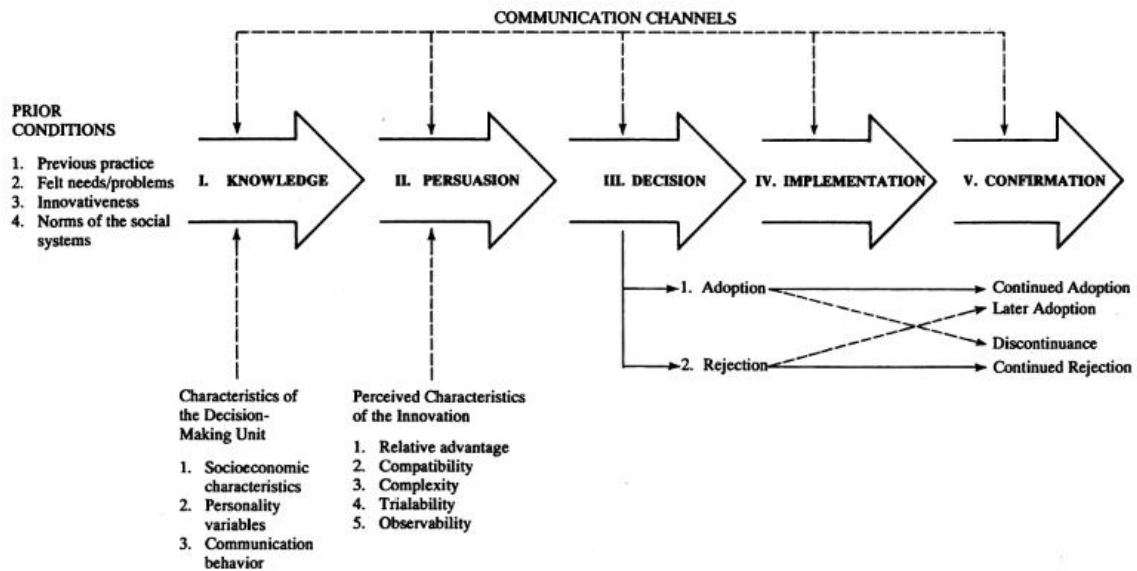
Rogers' (1995) set out to better understand the acceptance of technological systems with the Innovation Diffusions Theory (IDT). The innovation diffusion theory expressed as an idea, practice or object while diffusion is the process by which innovation or perceived new technology is communicated through specific channels over time among members of a social system (Rogers, 2003).

2.9 The Innovation-Diffusion Process

The diagram below begins with prior conditions of user behaviour and enters the communications channels, which have five steps: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. The flow of the diagram illustrated in order of sequential steps (Rogers, 2003). The innovation-decision method shown in figure 10.

FIGURE 9:

MODEL OF 5 STAGES OF THE INNOVATIVE-DIFFUSION PROCESS



Source: *Diffusion of Innovations, Fifth Edition* by Evert M. Rodgers

Rogers (2003) defines the innovation-diffusion process as “an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of innovation” (p. 172). The Diffusion Innovation Theory is made up of five unique individualities: relative advantage, compatibility, complexity, trialability and observability. Relative advantage is when an innovation significantly decreases the amount of work associated with an existing process of executing the same task. Rogers (2003) says that relative advantage has an affirmative influence on behavioural intention.

Compatibility is often compared to relative advantage, and many researchers note the similarities however, they are fundamentally different. (Rogers, 2003) stated, “compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (p. 15). In his literature review, (Sahin, 2006) said, “ If an innovation is compatible with an individual’s needs, the uncertainty will decrease, and the rate of adoption of the innovation will increase. Thus, even naming the innovation is an

important part of compatibility. What the innovation is called should be meaningful to the potential adopter. What the innovation means also should be clear. This is part of the complexity attribute” (p. 18).

(Rogers, 2003) definition of complexity relating to his theory is “the degree to which an innovation is perceived as relatively difficult to understand and use” (p. 15). As Rogers noted the degree of complexity had a detrimental effect on adoption figures as it turned out, the more complex the innovation, the less likely it would be adopted. Thus, unnecessary complexity proved to be a barrier to adoption.

According to (Rogers, 2003), “trialability is the degree to which an innovation may be experimented with on a limited basis”. Rogers concluded there was a relationship between innovation and the number of trials conducted thus, higher tests translated into higher user adoption

The last characteristic is observability. According to (Rogers, 2003) observability is “the degree to which the results of an innovation are visible to others” (p. 16). Peer observation is a significant variable; it can motivate or de-motivate a user base to adopt a specific system. If users see their peers using a platform that significantly improves the efficiency of a task there is a higher likelihood that other peers will follow suit. This model also has been tested extensively by Abdelghani, E., & Aziz, (2013); Brown, I., Cajee, Z., Davies, D., & Stroebel (2013); Shambare, (2011); Tobbin, (2011) who all found a positive correlation between observability and adoption.

2.10 Unified Technology Acceptance User theory (UTAUT)

Taking the foundation of the most mature bodies of research namely, TAM and Diffusion of Innovation Theory, Venkatesh (2003), sought to unify the literature associated with innovation acceptance by combining the additional theories;

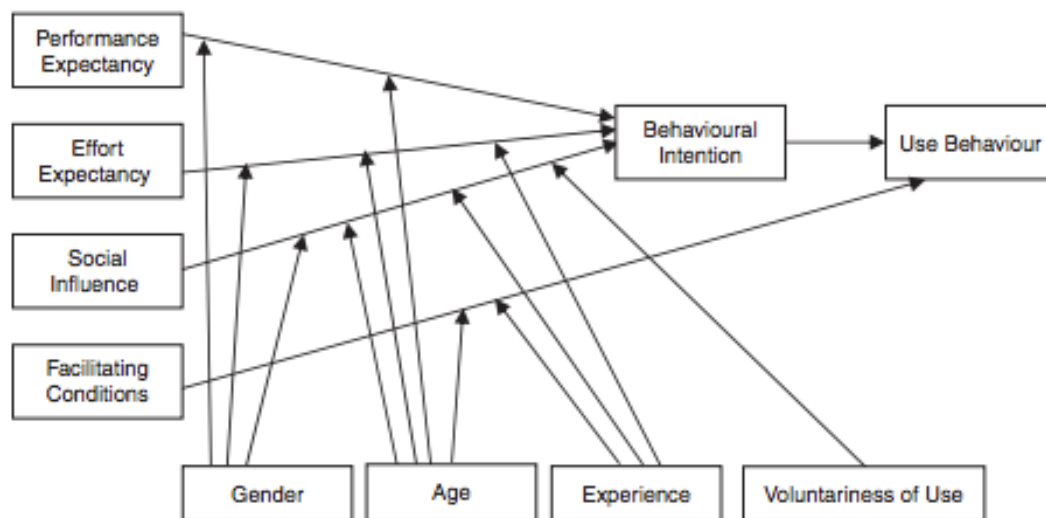
- Motivational Model,
- Theory of Reasoned Action,

- Theory of Planned Behavior/Technology Acceptance Model,
- Model of PC Utilization and
- Social Cognitive Theory

Venkatesh amalgamated the bodies above of literature to create his overarching view– The unified theory of acceptance and use of technology (UTAUT).

FIGURE 10:

UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT)



Source: Venkatesh et al. (2003)

Venkatesh et al. (2003b) uses four critical constructs in UTUAT; performance expectancy, effort expectancy, social influence and facilitating conditions. He aims to explain user intent to use a specific IT platform, which consequently determines user usage behaviour.

- Performance expectancy pertains to the degree to which the technology can better help perform a specific function or task.
- Effort expectancy is the ease of use associated with the system;
- Social Influence is the extent a user feels pressure from his or her peers to use the system in question;
- Facilitating conditions is the magnitude to which the user believes that the IT infrastructure exists to support the use of the platform.

Age, experience, gender, and voluntariness have an impact on Venkatesh (2003) four constructs thus changing the outcome of behavioural intention and user behaviour. Venkatesh (2003) succeeded in harmonising the literature on acceptance theory, however, if the UTUAT theory applied to complex system applications such as mobile banking in Africa modifications are necessary (Venkatesh et al., 2003a).

The four examined philosophies, Technology Acceptance Model (TAM), Task-Technology Fit (TTF), Diffusion of Innovation (DOI) and Unified Theory of Acceptance and Use of Technology (UTAUT) provide a breadth research around how we the users perceive and interact with the technology presented to us. As we have seen in the study, many variables contribute to adoption. However, the theme that has carried through all the research is that the technology must have a positive impact on the user and the organisation to foster positive attrition.

2.11 Determinants of Mobile Money Usage: Review of Empirical Studies

Odia (2012) applied the Technology Acceptance Model (TAM) to investigate mobile money in Nigeria using information from Kenya to determine what factors influenced the user's decision to use mobile money. Odia (2012) research technique was a combination of semi-structured one on one interviews and short questionnaire surveys. The results were expected, the most significant of all determining predictors was convenience, and in Nigeria, Mobile Money is not convenient or easy to use. As illustrated in the survey conducted by (InterMedia, 2014a, 2014b) we see that only 0.2% of the Nigerian population state they live within 1 kilometre from a mobile money agent thus, making the service very inconvenient to use. (Odia, 2012) results also indicated additional predictors of use, which are: security/privacy, perceived ease of use, perceived usefulness and trust.

In 2006, the Boston based Department for International Development conducted a study to identify which factors promoted acceptance of mobile banking in Africa. What they discovered was astonishing. In Africa, in 2006, the spread of mobile phones resulted in more mobile phone

owners/users than there were people with bank accounts. This technological leap laid the substructure for what today referred to as Mobile money or the mobile banking industry in Africa (Porteous, 2006). Porteous noted “these changes hold the prospect of accelerating access to financial services on the back of the mobile infrastructure (Porteous, 2006). For this technology to scale Porteous determined the following functionalities must exist; communication between multiple platform operators increased user security and improved customer trust. Soon after the mobile banking study completed by Porteous, Kenya saw the launch of a service called MPESA. MPESA launched in 2007, and by 2012 it had a customer base well over 17 million subscribers in Kenya. As an MPESA customer one can complete the following transactions: pay school fees, deposit-withdraw- and transfer money, transfer internationally, pay rent, apply for loans, send-receive-buy airtime & data and receive financial statements. Relatedly, Higgins et al. (2012) studied mobile money usage patterns of Kenyan SMEs in which, a survey of 900 SME’s where interviewed. The data came from SME’s located in urban, peri-urban and rural. Higgins, D., Kendall, J., & Lyon (2012) found all SME’s regardless of location used mobile money, in the same way, too: receive payment, pay bills, salaries, or suppliers. The data also indicated that the SME owner had used mobile money outside of business purposes to transact in their capacity as well.

A great deal of the Kenyan population found MPESA services added significant value while remaining affordable and reliable. Intermedia surveyed 2,980 households in Kenya, using a combination of interviews and questionnaires to determine mobile money adoption rates for this pool of participants. The InterMedia (2013) study mirrored that of Higgins, D., Kendall, J., & Lyon (2012) in that the primary use for mobile money for business purposes such as purchase inventory, receive payments for good and services and pay salaries. Additionally, the InterMedia survey found there was no discrepancy among rural, peri-urban and urban mobile money users in the way mobile money used commercially. An MIT research group claims much of the spread of MPESA is do the “rural-to-urban” migration in the country. As Mas and Morawczynski described:

"Because of the uneven structure of the Kenyan economy, it is common for a member of a rural household to seek employment in the city. In most cases, the male head of household

migrates, while wives and children remain at home. Poor alternatives for making domestic money transfers, particularly in the absence of technology-enabled or retail-based alternatives with a broad network of service points, also has fueled MPESA's growth." (Mas, I.

Morawczynski, 2009, p. 78).

M-PESA has increased its footprint in other countries, Democratic Republic of Congo, India, Afghanistan, and Tanzania. As of 2016, Vodacom discontinued all MPESA activity in South Africa, which again begs the question why does MPESA do so well in one African nation and so poorly in another? This thesis will explore this phenomenon using Nigeria and Kenya and the test countries.

USAID, the UN, and The World Bank emphasise the positive effect mobile devices have towards two paramount goals, alleviating poverty and increasing financial services to the underserved (Fernández-Ardèvol, 2011; "The World Bank," 2017; USAID, 2012). The UN states that mobile technology translates into "real" economic benefits: "The available evidence shows that the use of mobile phones can reduce information access costs and uncertainty in decision making. Transaction costs can be reduced, and market transparency should increase." (Fernández-Ardèvol, 2011) One of the reasons for MPESA's unprecedented success as the largest mobile money transfer platform's is their low transaction cost, which is comparatively cheaper than the traditional forms of banking. Conducting a study using a series of questionnaires, Mbogo (2010), sought to investigate the driving factor for the use of mobile money payments among small business owners. Using the same methodology as Odia (2012), (Mbogo 2010) applied the Technology Acceptance Model (TAM) to the survey data he collected to determine if mobile money enables growth among micro-entrepreneurs. The findings concluded that mobile money promotes entrepreneurship and financial inclusion by increasing the efficiency of "tasks" for the micro-entrepreneur; additionally, the MM platform allowed the micro-entrepreneur a platform to develop new services. Likewise, the study showed convenience, accessibility, reliability, cost, security, and support were conditions the micro-entrepreneur found important in the decision to use and the intention to use a mobile money platform to grow his or her business. The World Bank says "in Kenya M-PESA was routinely one-third to one-half as expensive as alternative systems. Lower costs directly translate into money the poor can keep..." (The World Bank, 2012,

p. 63). However, in countries where the mobile transfer programs (transaction costs) are not cheaper than traditional institutions the mobile money programs show stagnant growth rates.

The phone has become a conduit for which banks; marketers, healthcare providers, political institutions, and businesses can directly target and communicate with its citizens, consumers, and clients. USAID states “an increase of 10 percent of mobile phone penetration in a country has been correlated with a rise in the annual GDP growth rate by as much as 1.2 percent in a developing country” (USAID, 2012). GDP growth contributed to causality that increased phone penetration increases mobile banking, which in turn increases financial inclusion thus lifting the economy and resulting in positive economic growth.

“Around three-quarters of the world’s inhabitants now have access to a mobile phone and the mobile communications story is moving to a new level, which is not so much about the phone but how it is used, says a new report released today by the World Bank and *infoDev*, its technology entrepreneurship and innovation program. The number of mobile subscriptions in use worldwide, both pre-paid and post-paid, has grown from fewer than 1 billion in 2000 to over 6 billion now, of which nearly 5 billion in developing countries. Ownership of multiple subscriptions is becoming increasingly common, suggesting that their number will soon exceed that of the human population” (Maximizing Mobile, 2012).

As of 2015, mobile cellular subscriptions for the world per 100 people reached 98.3% (World Bank Development Indicators, 2012). As services via mobile devices skyrocket and the user become ever more empowered it is critical that security stay abreast of the development. Security through mobile transactions has two components, core risk which is associated with any banking agency model and user autonomy. The first refers to the user’s level of comfort knowing the transaction performed will take place. If there is a breach in security for any number of reasons it can compromise the ecosystem. The IFC report on Risk Management in Mobile Money accounted for six types of risk; systematic, operational, reputational, legal, liquidity, and fraud (IFC, 2011). Anyone of these threats if compromised threatens to de-stable the system. A collapse in security could cause the destruction of, or significant damage to, the financial system

which results in adverse public perception, possibly leading to lack of confidence and worst case scenario, a “run” on the system and or contagion effect (“IFC,” 2012). The second form of security refers user autonomy and the benefits seen in Kenya. Mobile Money is not tangible; thus it is not carried around like cash is. Studies have proven that petty crime in low-income areas in Kenya has decreased because of mobile money use and therefore money is less visible. Studies have shown that in Kenya women have developed and maintain savings accounts either without the approval of their husbands or without their husbands knowing (Morawczynski, 2009). A report on Kenya’s gender context concluded women in Kenya invest more of their cash income in family needs and children’s education than men do (The Nature Conservancy, 2013). After the violent clashes post Kenya’s 2007 presidential election, MPESA was one of the only ways that citizens could access cash as all the traditional banking institutions closed. MPESA allowed for business to carry on all from the safety of the user’s home, which is a time of crisis was incredibly valuable.

(Dzogbenuku, 2013) used the framework from the Diffusion of Innovation theory when he collected data from 550 Ghanaian undergraduate students to study the diffusion of mobile money. He analysed the data using correlation and regression analysis to determine the effect of relative advantage, complexity, compatibility, perceived risk, observability, trialability and service satisfaction on adoption of mobile money. The outcome showed a significant relationship between the independent and dependent variables.

(Abdelghani, E., & Aziz, 2013) used Diffusion of Innovation theory to test the intention of customer’s willingness to adopt mobile money. The study was conducted in Morocco and employed descriptive statistics, a t-test, and multiple regressions. Using 400 questionnaires (Abdelghani, E., & Aziz, 2013) found that consumers had the willingness to adopt mobile money. Moreover, results show that complexity, relative advantage, compatibility, and trialability are significant predictors of intention to adopt mobile money services.

Combining the Technology Acceptance Model (TAM) and Diffusion of Innovation Theory (Tobbin, 2011) investigated vital factors that influenced Ghanaian consumers’ acceptance and use of

mobile money. A survey was used to collect data. Perceived ease of use and perceived usefulness were found to be the most significant determinants of behavioural intention to use mobile money. Trust, trialability and perceived risk were also found to affect user intention significantly.

2.12 Conclusion

This chapter provides the literature on adoption of Mobile Money in Kenya and Nigeria. The section covers multiple theoretical concepts by numerous authors as well as conceptual matters regarding reasons for Mobile Money adoption. Lastly, this episode looked at a range of distinct empirical studies conducted by multiple researchers and their findings on information systems acceptance as a tool to benchmark mobile money adoption.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the empirical strategy adopted in the investigation of information system acceptance. It covers the research design, data sources and sampling, analytical framework and the description. The methodology tests the factors affecting the adoption of mobile money services in Kenya and Nigeria. Using the foundation of previous studies on technological and information systems acceptance where the usefulness of the “information system” was indicated if the system design was accepted or not (Venkatesh et al., 2003b). Mobile Technology, Regulatory Environment, demographics and consumer preference are the independent variables used in this model. The selected variables are similar to other studies, in which separate variables are used to determine the rate of adoption (Davis, 1898).

3.2 Research Design

The research design is a causal-comparative study (Leacock, Rose, & Warrican, 2009). This method is defined as “seeking to determine reasons (causes) for existing conditions (effects)” (Leacock et al., 2009) “with the limitation that only *possible* causes can be established since unknown or identified reasons may have been omitted”.

3.3 Data sources, collection, and sampling

The data is sourced from InterMedia’s Financial Inclusion Insight (FII) tracker survey dataset (Financial Inclusion Insights, 2015) with the following variables extracted from the survey; technology, consumer preference, demographics and livelihood and regulatory environment. “The data was collected using face to face surveys each lasting on average 57 minutes. “The data covers two independent survey periods for 2015 where 2,994 surveys were conducted each year for Kenya and 6,001 each year for Nigeria” (Financial Inclusion Insights, 2015). All questionnaires were collected as random samples and are thus a fair representation of each country is covered.

FII data was selected because of the detail collected in the face to face interview provided the necessary data to analyses the aforementioned variables in this study.

3.4 Analytical Framework

The analysis consisted of three steps. The first step is a comparative analytical approach applied to the following categories; technology, consumer preference, demographics and livelihood and regulatory environment. The comparative analysis shown as descriptive statistics between Kenya and Nigeria. (Yawe & Prabhu, 2015) (Yawe, 2015) used a similar approach when comparing countries. The second step utilizes a binary regression which is then used to model an outcome for example “using MM” versus “not using MM” as defined by (Dougherty, 2011) and used by (Yawe & Prabhu, 2015). Tests for heteroscedasticity, normality and multicollinearity was run on the data. In addition, a *logit* rather than a *probit* model (Dougherty, 2011) was used to determine whether any corrections need to be made. The third step identifies the significant variable used to determine the effect of MMU.

3.5 Regression Model

To identify the significant factors that explain mobile money usage in Kenya and Nigeria, the study adopts the empirical model of (Weiers, Ronald, 2008) is specified below;

$$mmu_i = \beta_0 + \beta_1 cf_i + \beta_2 regf_i + \beta_3 techf_i + \beta_4 DG1_i + \beta_5 DG2_i + \beta_6 DG4_i + \beta_7 DL11_i + \beta_8 DL15_i + \beta_9 IFI_i + \varepsilon_i$$

where mmu_i refers to mobile money usage of respondent, where usage means that an individual has used his/her registered account to transfer money, save or borrow within the previous 90 days i ; cf_i denotes the consumer factors of respondent i made up of general consumer characteristics such as; registered bank account, awareness of Mobile Money, access to financial advice; $regf$ denotes regulatory factors such as MM availability, MM transaction experience, MM agent asking for PIN your PIN ; $techf$ represent technological factors defined as; household access to and ownership of mobile technology, personal ownership of a mobile phone; dgf represents demographics and livelihood such as; age, sex and highest level of education.

3.6 Description of Variables

The data used in this study is extracted from InterMedia's Financial Inclusion Insight (FII) tracker survey dataset for the year 2015. This study will use the results of Kenya and Nigeria. The three primary variables to be established are the categories of (i) technology, (ii) regulatory environment, and (iii) consumer preferences (iv) demographics and livelihood. From the survey data obtained, Table 1 indicates the most relevant variables included for each specific category. For each class, the following was taken into account when considering the most relevant variable:

- (i) Mobile technology: Mobile technology is the vehicle through which Mobile Money functions and therefore the availability of mobile technology to an individual will be a significant contributing difference to whether the respondents make use of Mobile Money or not. Mobile technology allows a platform for Mobile Money to be utilized and therefore if a respondent has a mobile phone, for instance, it could then be expected that they would be an MM user or at least have access to MM services.
- (ii) Regulatory environment: In trusted regulatory environment, the use of Mobile Money can be considered safe and trustworthy and therefore worthwhile for the individual in each respective market. If factors including the security of fund and an honest, efficient and consistent network of agents are available for the facilitation of cash exchange, then these variables can be significant in explaining the use of Mobile Money by the individual.
- (iii) Consumer preference: Financial literacy of users is the primary driver as to whether they will use Mobile Money or not. If an individual is unaware of the existence of Mobile Money and how it works, then they are less likely to use the service. Mobile Money is mainly a financial inclusion product, and therefore individuals with bank accounts registered in their names will less likely use Mobile Money as they are already financially included. The financial literacy of individuals in the different markets is also informed by whom the individuals depend on most for financial advice, if they even depend on a financially illiterate person then it will be a situation of the blind leading the blind.

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- (iv) Demographics and livelihood: Age, gender, level of education and ownership of a bank account are an important variable when determining MMU. Age gives indication as to whether the respondent could be old enough to own or afford a mobile phone. Gender of the respondent gives a good indication as to whom oversees the financials at home. Education level indicates whether the user has the means to understand the minor complexities of MM. Ownership of a bank account would indicate that MM services may or may not be a necessary financial option for the respondent.

3.7 Theoretical Discussion of Selected Variables

This section provides a theoretical discussion for each of the variables specified in the regression model, on how they affect the usage of mobile money.

- a. How many people in your household have a mobile phone?

This variable quantifies the level of technology that the respondent is exposed to and Mobile Money usage is highly dependent on technological awareness as Mobile Money in Kenya is provided by telecommunications, which requires access to a mobile phone (The World Bank 2017).

- b. Has a mobile money agent asked for your PIN number? AND Have you ever experienced any of the following issues with any mobile money agent? – The agent did not have enough cash/ e-float or could not perform the transaction?

These two variables quantify the regulatory environment surrounding the usage of Mobile Money and whether it is safe and trustworthy. If a Mobile Money agent requests the user's PIN number that decreases the level of trust towards that services as the agent is not supposed to ask for the user's PIN. The second variable is the efficiency factor of the Mobile Money service; if agents do not have problems of cash/e-float shortage and can perform all transactions, then the service is provided seamlessly and consistently and therefore displays a sound regulatory framework (Mas & Radcliffe, 2011).

- c. Do you personally have a bank account registered in your name? AND Have you ever heard of something called mobile money? AND What or who do you depend on the most for financial advice?

Consumer’s preferences, which drive the usage of Mobile Money, are affected by these three selected variables. The first being financial literacy, which in this case is whether a respondent knows about Mobile Money or not as if they know about the service they are more likely to make use of it. Financial literacy of the respondents is also dependent on whom they depend on for financial advice, and that person’s level of financial literacy will inform their information dependent’s level of financial literacy (Ernst & Young, 2012).

The respondent’s ownership of a bank account informs whether they are financially included, and active financial individuals are generally expected to be financially literate and therefore more likely to be registered for Mobile Money.

TABLE 2: CODING MATRIX FOR SELECTED VARIABLES

Label	Question	Values	Type
DG1	Age/ What year were you born?	n/a03/12/2017 999=DK Refused	Numeric
DG2	Is the respondent male or female?	1=Male; 2=Female	Single
DG4	What is your highest level of education?	See appendix (DG4)	Single
FF1	Do you have a personal bank account that is registered in your name?	1= Yes; 2= No	Single
#MM1	Have you ever heard of something called mobile money?	1= Yes; 2= No	Single
FL4	What or who do you depend on most for financial advice?	See table in appendix (FL4)	Single
MM38_3	Have you ever experienced any of the following issues with any mobile money agent? Agent did not have enough cash or e-float to perform a transaction?	1= Yes; 2= No	Single
M38_13	Have you ever experienced any of the following issues with any mobile money agent? Agent asked for my PIN number.	1= Yes; 2= No	Single
MT1	How many people in your household have a mobile phone?	n/a; 999=DK/refused	Numeric

Source: Financial Inclusion Insights (FI) Tracker Survey Codebook

3.8 Control Variables

The study also controls for demographic characteristics which include;

1. Age (DG1)- Mobile phone access usually limited to a certain age group; hence this would limit the younger portion of the population to use MM.
2. Gender of the respondent (DG2)- Both Kenya and Nigeria male-dominated societies thus gender could play a significant role in MMU.
3. Level of education (DG4)- due to the financial complexity of MM, the level of education could be substantial with regards to MMU.
4. Registered Bank Account (FF1)- lacking access to a traditional bank account should increase the value proposition for MMU.
5. Have you heard of something called MM (MM1)- awareness and education regarding available financial services should have a significant impact on MM usage?
6. Where do you get your financial advice (FL4)- depending on the source of financial advice this could increase or decrease MMU?
7. Have you ever experienced transactional issues with MM? (MM38_3)- not being able to perform a core financial transaction could put a bad taste in the consumer's mouth prompting them to seek other services aside from MM.
8. How many people in your household have a mobile phone? (MT1)- MM is dependent on the respondent having access to a mobile device, the more devices a household has, the higher likelihood the respondent has access to MM services.

It is worth noting that unlike the basic model (as presented in Table 4 & 5), some independent variables have a positive relationship with the dependent variable. In Kenya for instance, the year of birth is positively related to with MMU. That implies that MMU is more popular with the younger age groups and less popular with older age groups. However, this trend does not hold true for Nigeria as MMU is more popular with the older people compared to the younger people.

3.9 Estimation Approach

The estimation of the regression model is applied to examine the significance of the variables in Table 2 which explain why respondents use Mobile Money in their respective markets, this study employs both the Probit and Logit models. This study uses quantitative data to model dichotomous dependent variables as seen in table 3.1, e.g. (1,2, yes/no,). The probit and logit (i) respects the boundaries of the dependent variable; (ii) allows for different rates of change at the

low and high ends of the beer scale, and 3) (assuming proper specification of independent variables) does away with heteroskedasticity (Albright, J 2015).

The logit and the probit modify the linear model and feed it through a function to yield a non-linear relationship. The linear regression is:

$$\gamma = \alpha + \beta x$$

The logit and probit predictors can be written as:

$$\hat{y} = f(\alpha + Bx)$$

Logit and probit differ in how they define $f(*)$. The logit model uses the cumulative distribution function of the logistic distribution. The probit model uses the cumulative distribution function of the standard normal distribution to define $f(*)$. Both functions will take any number and rescale it to fall between 0 and 1. This whatever $\alpha + Bx$ equals, it can be transformed by the function to yield a predicted probability (Dougherty, 2011).

The logit and probit regressions were run for both Kenya and Nigeria, and the output is given in Table 3 and Table 4 respectively. At a 10% level of significance, the statistical significance of the independent variables is indicated in, both the logit and probit output of this analysis. The analysis for Kenya indicates that the independent variables correctly predict approximately 78% of the variation of the dependent variable. In Nigeria however, approximately 83% of the variation of the dependent variable is accurately predicted by the independent variables.

In Kenya, the possession of a mobile phone, the lack of an agent's full capacity assistance and the ownership of a bank account by the respondent are all statistically significant in explaining whether a respondent uses mobile money or not. For Nigeria, only the possession of a bank account and the possible knowledge about Mobile Money are significant in explaining Mobile Money registration in Nigeria.

3.10 Limitations

The limitations of the selected methodology are as follows:

- The overall boundaries associated with regression analysis and binary regression models apply to this study as described by (Dougherty, 2011);

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- Since an existing survey dataset is being utilised, causal variables outside of the existing survey data cannot be analysed.

CHAPTER FOUR: DISCUSSION OF FINDINGS

4.1 Introduction

This chapter will discuss in detail the results from the datasets. It covers, descriptive statistics, correlation analysis, and determinants of mobile money usage, mode diagnostics and diagnostic tests for both countries.

4.2 Descriptive Statistics

In Table 3 the average age of the respondent (DG1) in Kenya was 36 years old while in Nigeria the average age of the respondent was 4 years younger (32). Table 3 shows that respondent's age for Kenya and Nigeria ranged from 15 to 90 and 15 to 95 [AL1] respectively. The gender sample of the respondents (DG2) in Kenya was predominantly female at 59% and 41% male whereas in Nigeria the gender composition of those surveyed was 42% female and 58% male. With regards to the level of education of respondents (DG4), Nigerians on average received a slightly higher education level compared to Kenyans. Nigerians received secondary vocational training with some certificate while Kenyans received some secondary education. In respect of personal bank account ownership (FF1) among the respondents, the findings indicate that 65% of respondents surveyed in Kenya did not have a bank account whereas, only 58% of the respondents in Nigeria claimed not to have a bank account. When the respondents were asked about where they received their financial advice (FL4), respondents in both countries responded the same; radio and the newspaper is where the respondents surveyed receive their financial advice. In respect of the knowledge of respondents (MM1) of MM services, the findings indicate that about 84% of respondents surveyed in Kenya were aware of such services while only about 19% of the respondents in Nigeria claimed knowledge of MM. Regarding the respondent's experience with a MM agent not having enough e-float to perform a financial transaction (MM38_3) the survey indicates that about 93% of those surveyed in Kenya had not experienced such issues, similarly 94% of the respondents in Nigeria also had no experience with such issues. It could be suggested that the Nigerian respondent had not experienced such a financial service issue because 96% of those surveyed said they were not aware of a MM service point (InterMedia, 2014a, 2014b). The

results in (MT1) as to whether the respondents surveyed have access to a mobile phone indicated that 97% of Kenyans had access to a mobile device while only 73% respondent's surveys in Nigeria claimed to have access to a mobile phone, The survey data indicates the mean number of registered MM users in Kenya is 84%, while the mean number of registered MM users in Nigeria is 0.008% suggesting that the Central Bank of Nigeria's regulatory framework for Mobile Money services was the unpalatable for most service providers, thus creating an environment unsuitable for MM services (Central Bank of Nigeria, 2015).

TABLE 3: DESCRIPTIVE STATISTICS

	DG1	DG2	DG4	FF1	FL4	MM1	MM38_13	MT1	REGISTERED_MM
Kenya									
Mean	36	1.597526	4.155052	1.655670	9.501856	1.205773	1.932784	1.971546	0.861443
Median	32	2	3	2	8	1	2	2	1
Maximum	90	2	15	2	20	2	2	10	1
Minimum	15	1	1	1	1	1	1	-99	0
Std. Dev.	14.22518	0.490498	2.533904	0.475247	7.543336	0.404349	0.250448	2.299828	0.345555
Count	2425	2425	2425	2425	2425	2425	2425	2425	2425
Nigeria									
	DG1	DG2	DG4	FF1	FL4	MM1	MM38_13	MT1	REGISTERED_MM
Mean	32	1.429262	5.786202	1.585902	9.332611	1.842026	1.942857	1.730045	0.008332
Median	29	1	5	2	8	2	2	2	0
Maximum	95	2	15	2	20	2	2	17	1
Minimum	15	1	1	1	1	1	1	-99	0
Std. Dev.	12.14256	0.495012	3.168877	0.492607	7.103686	0.364747	0.233791	7.527823	0.090906
Count	5970	6001	6001	6001	6001	6001	70	6001	6001

Notes: MT1=Household mobile phone ownership; FF1=Ownership of personal bank account; MM1= Knowledge of Mobile Money.; FL4=Dependence for financial advice, MM38_3= Having been asked for Mobile Money PIN number.; DG1= AGE, DG2= Sex of the respondent, DG4= Highest level of education of respondent.

4.3 Correlation Analysis

Table 4 shows that none of the correlation between the different independent variables is significant to be a cause for concern for multiple collinearities for both Kenya and Nigeria. The direction of relationships between the dependent and independent variables are consistent in both Kenya and Nigeria samples except for the FL4, MM38_1 and MT1 variables; a positive relationship exists between the independent variables and the dependent variable in the case of Kenya while the opposite is true in Nigeria.

TABLE 4: CORRELATION MATRIX

	DG1	DG2	DG4	FF1	FL4	MM1	MM38_13	MT1
Kenya								
DG2	0.13173							
DG4	0.19407	-0.09482						
FF1	0.11250	0.18925	-0.37770					
FL4	-0.08365	-0.18388	0.02761	-0.04775				
MM1	-0.07840	0.09534	-0.15195	0.11769	0.02483			
MM38_13	0.07452	-0.05576	0.11784	-0.09055	0.05892	-0.02631		
MT1	-0.00708	0.00740	0.06298	-0.05879	-0.03292	-0.01100	0.00456	
REGISTERED_MM	-0.19399	-0.03707	0.12160	-0.22532	0.02495	-0.06159	0.03058	0.01632
Nigeria								
DG2	-0.00147							
DG4	-0.11172	0.04326						
FF1	0.29309	0.05338	-0.29400					
FL4	0.09993	-0.04563	-0.11538	-0.01902				
MM1	-0.19308	0.23970	-0.17540	0.23814	0.11369			
MM38_13	0.10996	-0.13679	-0.13756	0.07538	0.12351	0.08206		
MT1	0.05369	0.10585	0.01509	0.20340	0.00478	0.19837	0.01533	
REGISTERED_MM	-0.05655	-0.10720	0.05903	-0.30429	-0.19510	-0.34783	-0.18349	-0.10522

Notes: MT1=Household mobile phone ownership; FF1=Ownership of personal bank account; MM1= Knowledge of Mobile Money.; FL4=Dependence for financial advice, MM38_3= Having been asked for Mobile Money PIN number.; DG1= Age, DG2= Sex of the respondent, DG4= Highest level of education of respondent.

Table 4 represents the correlation analysis for the variables selected in the study. In Kenya, it is evident that the relationship between Mobile Money registration (Registered_MM) and cellphones owned in a household (MT1), is positive while ownership of a personal bank account (FF1), and knowing about Mobile Money (MM1) have a minimal but negative relationship with Registered_MM. Whereas, whether an agent has requested the Mobile Money PIN number (M38_13) and whom the respondents depend on most for financial advice (FL4) have a positive relationship with whether a respondent is registered with Mobile Money (Registered_MM) or not.

For Nigeria, the correlation analysis displays a negative relationship with all the independent variables and the dependent variable for Mobile Money registration (Registered_MM). These results are in line with expectations due to the low uptake of Mobile Money in Nigeria.

4.4 Determinants of Mobile Money Use

The results in Table 5 shows the effect of the consumer preferences, regulatory, technological, demographics & livelihood factors on mobile money usage in Kenya and Nigeria. The regression models were estimated using both the logit and probit techniques which are suitable for the binary dependent variables as used in this study. The results of the probit model for both Kenya and Nigeria is presented in Table 5 while the logit is captured in Table 4.4.

From the probit results in Table 5, it is observed in the Kenya sample that, at a 5% significance level, the variables (DG2), (FL4), (MM38_13) and (MT1) are all not significant in affecting the dependent variable while the rest of the independent variables are significant. For instance, the age of respondent (DG1) is observed to be negatively related to MM at 1% level of significance, a follow up study found a significant gap exists between age and phone ownership (GSMA, 2016). This indicates that there are more younger respondents from Kenya have a higher probability of being registered with MM compared with older respondents in Kenya. This could be explained by the relatively older age of the respondent in Kenya. The level of education (DG4) is observed to be positively related to MM at 1% level of significance. This indicates educated respondents from Kenya have a higher probability of being registered with MM compared to those with less education (Porteous, 2006). This could be explained by a relatively high education rate in Kenya. Whereas, having a registered bank account (FF1) is observed to be negatively related to MM at 1% level of significance. This indicates respondents without a bank account have a higher probability of being registered mobile money account and suggests that that respondents without bank accounts use mobile money account as a substitute (Bhan, 2012) . This could be explained by a vast MM infrastructure and poor traditional banking infrastructure pushing respondents in Kenya to use MM. The awareness and knowledge of MM (MM1) are observed to be negatively related to MM at 5% level of significance. From the coding of the variable which uses 1 (Yes) as the reference point, this indicates that respondents who are not aware of MM have a lower probability of registering with MM compared to those who are aware of MM in Kenya. Such high consumer awareness could be explained by the efforts of the MNO's to educate and inform the public about the financial services available to them via a mobile device.

In Nigeria, a personal bank account registered in your name (FF1) is observed to be negatively related to MM at 1% level of significance. This indicates that there are more respondents that do not have a bank account (Odia, 2012). This could be explained by the lack of traditional banking infrastructure available to the Nigerian respondents. Most respondents in Nigeria have

not heard of something called Mobile Money (MM1), which is observed to be negatively related to MM at 1% level of significance. This could be explained to the Central Bank of Nigeria implementing strict regulatory framework this preventing private companies like those in Kenya from entering the Nigerian market (Central Bank of Nigeria, 2015). The age of respondent (DG1) is observed to be positively related to MM at 10% level of significance. This indicates that there are more older respondents from Nigeria that have a higher probability of being registered with MM compared with younger respondents in Nigeria. Additionally, the gender of the respondent (DG2) is observed to be positively related to MM at 5% level of significance. This shows that there are more male respondents from Nigeria that have a higher probability of being registered with MM (Odia, 2012). This could be because the gender composition of the survey was 58% male and 42% female. The education level (DG4) of the respondent is observed to be positively related to MM at a 10% level of significance. This shows there is no correlation between education and MM registration; this could be due to the lack of MM infrastructure available to educated Nigerians. Where respondents receive their financial advice (FL4), it is observed to be negatively related to MM at 5% level of significance. There is a higher probability that the respondent from Nigeria will not have a registered MM account because the source of their financial advice (newspaper and radio) is not advocating for MM financial services. In the case of Nigeria, the only variable that is not significant at a 10% significance level is the (MT1-mobile phone ownership) variable; the rest are all significant. However, the R squared values for Kenya and Nigeria are 12.95% and 34.94% suggesting that the model is relatively a poor fit for the data estimated.

TABLE 5: REGRESSION RESULTS: PROBIT MODELS

Dependent Variable: REGISTERED_MM								
Kenya					Nigeria			
Variable	Coefficient	Std. Error	z	Prob.	Coefficient	Std. Error	z-	Prob.
C	52.189	5.446	9.584	0.000***	-26.1962	16.3671	-1.6005	0.1095
DG1	-0.025	0.003	-9.155	0.000***	0.0139	0.0083	1.6791	0.0931*
DG2	0.110	0.074	1.491	0.136	-0.3546	0.1647	-2.1524	0.0314**
DG4	0.085	0.019	4.504	0.000***	0.0473	0.0269	1.7583	0.0787*
FF1	-0.777	0.100	-7.782	0.000***	-0.9198	0.3538	-2.6001	0.0093***
FL4	0.000	0.005	0.104	0.9172	-0.0228	0.0102	-2.2379	0.0252**
MM1	-0.188	0.081	-2.314	0.0207**	-1.7140	0.3065	-5.5927	0.0000***
MM38_13	0.111	0.128	0.860	0.3896				
MT1	0.002	0.013	0.163	0.8708	0.0062	0.0207	0.2969	0.7666
McFadden R-squared	0.1295				0.349203			
S.D. dependent var	0.3456				0.09114			
LR statistic	252.7786				201.7794			
Prob (LR statistic)	0.0000				0			
Observations	2425				5970			
Obs with Dep=0	336				5920			
Obs with Dep=1	2089				50			

Notes: MT1=Household mobile phone ownership; FF1=Ownership of personal bank account; MM1= Knowledge of Mobile Money.; FL4=Dependence for financial advice, MM38_3= Having been asked for Mobile Money PIN number.; DG1= Age of respondent, DG2= Sex of the respondent, DG4= Highest level of education of respondent. OR= estimated odds ratio ***, ** and * denotes significance at 1%, 5% and 10% respectively.

4.4.1 Logit Results

The result of the logistic model is presented in Table 6. Unlike the Probit coefficients, the odds ratio (OR) is computed for the logistic coefficients. The OR represents the constant effect of each independent variable on the likelihood of a respondent being registered with MM. OR values less than 1 indicate that less likelihood of being registered with MM and vice versa. The (MT1) variable is not significant in estimating the dependent variable in both samples. The the logit results is also consistent with the Probit model in that the variables (DG2), (FL4), (MM38_13) and (MT1) are all not significance in estimating the dependent variable while the rest of the independent variables are significant (for the Kenya case). However, in the case of Nigeria, the logit model shows that the variables (DG1) and (DG4) variables are not significant in estimating the dependent variable. Whereas, there is a marginal improvement in the R squared values for the Logit models relative to the probit model suggesting that the former model output is more reliable than the latter.

For instance, the age of respondent (DG1) is observed to be negatively related to MM at 1% level of significance. This indicates that there are more younger respondents from Kenya have a higher likelihood of being registered with MM compared with older respondents in Kenya (Beck, T. Demirguc-Kunt, A., Peria, M., 2005). The education level of the respondent (DG4) is observed to be positively related to MM at 1% level of significance. This indicates that the more educated respondents from Kenya have a higher probability of being registered with MM compared with the respondents in Kenya who have less education. The ownership of a personal bank account (FF1) is observed to be negatively related to MM at 1% level of significance. From the coding of the variable which uses 1 (Yes) as the reference point, this indicates that respondents who do not have a bank account have a higher probability of registering with MM compared to those who do have a bank account in Kenya. Knowledge and awareness of something called MM (MM1), is perceived to be negatively related to MM at 5% level of significance (Bhan, 2015). From the coding of the variable which uses 1 (yes) and 2 (no) as reference points, we gather that respondents who have heard of MM have a higher probability of registering with MM compared to those that have not heard of MM.

The gender of the respondent (DG2) is observed to be negatively related to MM at 5% level of significance. This indicates that there are more male respondents from Nigeria have a higher probability of being registered with MM. This could be because the gender composition of the survey was 58% male and 42% female. Whether or not the respondent has a personal bank account (FF1) is detected to be negatively related to MM at 5% level of significance. This shows that there is a higher probability that a respondent from Nigeria will not have a personal bank account and not have a registered MM account. This could be because of the Nigerian respondents 2% live less than 1 kilometer from an MM agent, 39% live less than 1 kilometer from a bank branch, and 37% live less than 1 kilometer from an ATM thus, most of the respondents live further than 1 kilometer from any type of consumer financial service point. The results of this study are consistent with the findings from the empirical studies of Mas & Radcliffe (2011), Lal & Shadev (2015) and (Demirguc-Kunt & Klapper, 2012). The results also show the coefficient of (FL4), where respondents receive their financial advice is observed to be negatively related to MM at 5% level of significance. There is a higher likelihood that the respondent from Nigeria will not have a registered MM account because the source of their financial advice (newspaper and radio) is not advocating for MM financial services. When asked if the respondents have heard of something called MM (MM1), it shows to be negatively related

to MM at 1% level of significance (Brown, Cajee, Davies & Stroebel, 2013). From the coding of the variable which uses 1 (yes) and 2 (no) as reference points, we gather that respondents who have heard of MM have a higher probability of registering with MM compared to those that have not heard of MM. Similar to the Probit results in Table 4 the results from the logit estimation show that the ownership of mobile phone (MT1) is not significant in explaining mobile money usage in both Kenya and Nigeria.

Based on the estimated odds ratio, only educational qualification increases the odds of using mobile money in Kenya while age, ownership of bank account and knowledge of mobile money decreases the odds of registering a mobile money account. In respect of Nigeria, gender, ownership of bank account, dependence for financial advice and knowledge of mobile money were observed to decrease the odds of registering a mobile money account

TABLE 6: ADDITIONAL INDEPENDENT VARIABLES: LOGIT MODEL

Dependent Variable: REGISTERED_MM						
Variable	Kenya			Nigeria		
	Coefficient	OR	z	Coefficient	OR	z
C	110.4637		9.6104***	-51.0148		-1.4718
DG1	-0.0538	0.95	-9.2318***	0.0282	1.03	1.6153
DG2	0.1962	1.22	1.4491	-0.7489	0.47	-2.0688**
DG4	0.1578	1.17	4.4033***	0.0943	1.10	1.6262
FF1	-1.6052	0.20	-7.3360***	-2.4185	0.09	-2.3480**
FL4	0.0011	1.00	0.1281	-0.0509	0.95	-2.2989**
MM1	-0.3420	0.71	-2.3621**	-4.7202	0.01	-4.6280***
MM38_13	0.2351	1.27	1.0324			
MT1	0.0005	1.00	0.0261	0.015842	1.02	0.30662
McFadden R-squared	0.136365			0.348167		
S.D. dependent var	0.345555			0.09114		
LR statistic	266.0929			201.1807		
Prob (LR statistic)	0.0000			0.0000		
Observations	2425			5970		
Obs with Dep=0	336			5920		
Obs with Dep=1	2089			50		

Notes: MT1=Household mobile phone ownership; FF1=Ownership of personal bank account; MM1= Knowledge of Mobile Money.; FL4=Dependence for financial advice, MM38_3= Having been asked for Mobile Money PIN number.; DG1= Age of respondent, DG2= Sex of the respondent, DG4= Highest level of education of respondent. OR = estimated odds ratio ***, ** and * denotes significance at 1%, 5% and 10% respectively

TABLE 7: SIGNIFICANCE OF INDEPENDENT VARIABLES (A=0.1)

Variable	Kenya	Nigeria
Age/ Year respondent was born? (DG1)	Yes	Yes
Gender of the respondent? (DG2)	No	Yes
Highest level of education of respondent? (DG4)	Yes	Yes
Do you personally have a bank account registered in your name? (FF1)	Yes	Yes
What or who do you depend on for financial advice? (FL4)	No	Yes
Knowledge of Mobile Money? (MM1)	Yes	Yes
Have you ever experienced any of the following issues with any mobile money agent? – The agent did not have enough cash/ e-float or could not perform the transaction? (M38_13)	No	-
How many people in your household have a mobile phone? (MT1)	No	No

TABLE 8: SIGNIFICANCE OF ADDITIONAL INDEPENDENT VARIABLES (A=0.05)

Variable	Kenya	Nigeria
Age/ Year respondent was born? (DG1)	Yes	No
Gender of the respondent? (DG2)	No	Yes
Highest level of education of respondent? (DG4)	Yes	No
Do you personally have a bank account registered in your name? (FF1)	Yes	Yes
What or who do you depend on for financial advice? (FL4)	No	Yes
Knowledge of Mobile Money? (MM1)	Yes	Yes
Have you ever experienced any of the following issues with any mobile money agent? – The agent did not have enough cash/ e-float or could not perform the transaction? (M38_13)	Yes	-
How many people in your household have a mobile phone? (MT1)	No	No

The regression coefficients conducted for Kenya and Nigeria is shown in Table 9 to be stable, and therefore the coefficients estimated in this regression are consistent. The test for normality is conducted using the Jarque-Bera test statistic's p-value for testing normality in the residuals. The test for multicollinearity is conducted using Variance Inflation Factor (VIF), which can be calculated from the R^2 as $\frac{1}{1-R^2}$. There is no evidence of multicollinearity and the residuals for the

regressions run follow a normal distribution. Due to there being no multicollinearity, it can be assumed that the regressions run is homoscedastic.

TABLE 9: DIAGNOSTIC TESTS

Kenya			
Logit			
H₀	Normality	H₀	No Multicollinearity
p-value	0.528	Test statistic	1.091
Conclusion	Do not reject H ₀	Conclusion	Do not reject H ₀
Probit			
H₀	Normality	H₀	No Multicollinearity
p-value	0.538	Test statistic	1.092
Conclusion	Do not reject H ₀	Conclusion	Do not reject H ₀
Nigeria			
Probit			
H₀	Normality	H₀	No Multicollinearity
p-value	0.448	Test statistic	1.344
Conclusion	Do not reject H ₀	Conclusion	Do not reject H ₀
Logit			
H₀	Normality	H₀	No Multicollinearity
p-value	0.436	Test statistic	1.339
Conclusion	Do not reject H ₀	Conclusion	Do not reject H ₀

4.5 Conclusion

The purpose of this study is to test the hypothesis of whether the variables for technology, regulatory environment, and consumer preference are significant in explaining the choice whether to use mobile money in the markets in Kenya and Nigeria. This study employs 2015 data from the InterMedia’s Financial Inclusion Insight (FII) tracker survey dataset. The analysis of this data is conducted using both the logit and probit models to ascertain consistency in the coefficients estimated and the results presented show that Kenya. As opposed to Nigeria, has a higher level of mobile money penetration, which is explained by the fact that Mobile Money in Kenya is mainly telecommunications-led as opposed to Nigeria’s Mobile Money, which is mainly bank-led.

The average respondent of the populations in both markets has access to a mobile phone, and hence technology is not a limiting factor to the penetration of Mobile Money in both these markets. The primary limiting factor is low levels of financial education or literacy. The average Nigerian respondent did not know about Mobile Money whereas the average Kenyan

respondent knew something about Mobile Money. The main point highlights the need for more financial education in Nigeria so that that the financially excluded can receive knowledge on relevant information that will lead them to the path of financial inclusion.

Therefore, based on the assessment above, the multiple linear regression outputs indicate that the independent variables (DG1), (DG4), (FF1) and (MM1) variables are significant in estimating mobile money use in Kenya while the variable (DG1), (DG2), (DG4), (FF1), (F14) and (MM1) are significant in estimating mobile money use in Nigeria. The differences in the two countries could be attributed to the difference in demographics, cultures as well as the fact that mobile money penetration in Kenya is relatively more significant than that of Nigeria. This penetration ratio also has an impact on the perception of people when it comes to using the mobile money facility.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter will discuss the summary of the study, the objective and motivation for the study, the data and economical technique employed for analysing the data and its major findings. Additionally, the researched suggests recommendations for further research, into cryptocurrency due to its parallels with mobile money.

5.2 Summary of the study

The objective of the study was to identify whether technology, the regulatory environment, consumer preferences, demographics and livelihood were significant variables contributing to the difference in mobile money usage in Kenya and Nigeria.

The data used in this study was from Intermedia's Financial Inclusion Insight (FII) tracker survey dataset (Financial Inclusion Insights, 2015). The variables analyzed were; *technology, demographics and livelihood, regulatory environment and consumer preferences*. The data was collected using face to face surveys each lasting just under an hour. The data consists of 2,994 surveys for Kenya in 2015 and 6,001 surveys for Nigeria in 2015 (Financial Inclusion Insights, 2015). All surveys were collected as random samples thus the data is representative of the entirety of both countries.

The analysis of this data is conducted using both the logit and probit models to ascertain consistency in the coefficients estimated and the results presented show that Kenya. As opposed to Nigeria has a higher level of mobile money penetration, explained by the fact that Mobile Money in Kenya is mainly telecommunications-led as opposed to Nigeria's Mobile Money, which is primarily bank-led.

5.3 Conclusion

This chapter concludes and provides recommendations, used for further research. Based on the findings, the study revealed that technology was not a mitigating factor as respondents in both markets had mobile devices, which would allow access to MM services; however, the mitigating factor lies behind the institution advocating the service. Both datasets revealed that most respondents in Kenya and Nigeria owned a mobile device, holding a mobile device negates the assumption that there is a significant technological rift between the two countries hence. Thus it can be concluded that Nigerian bank led approach to launch Mobile Money was an incorrect conduit to market.

In Kenya, success is “due to Mobile Money being ‘telecom-led’. The telecommunication company Safaricom entered the Mobile Money market in Kenya back in 2007 with a platform called M-PESA. Safaricom invested in the infrastructure, trained their agents all over the country to become Mobile Money agents and simultaneously promoted awareness. Safaricom has been successful due to the high penetration of mobile phones throughout Kenya as well as a large unbanked population. There was also little regulation at the time, which helped facilitate market innovation. Subsequently, other telecommunication companies have entered the market, but they still have a small market share in comparison to Safaricom” (IEA, 2016).

Today, most of the transactions done in Kenya’s economy directs through M-PESA(World Bank, 2016). Safaricom has been undeniably very useful and now can facilitate a limited range of loans, savings, insurance products as well as financial transactions. The M-PESA platform is not just used by the rural poor. People with traditional bank accounts, small business, merchants, traders and well-to-do families use it for ease of making a payment. M-PESA may never replace the role of traditional banks, but it allows access to individuals who otherwise would not be able to make electronic payments.

In Nigeria, there is also a large unbanked population and high levels of telecommunications coverage. However, the Mobile Money experience here has not yet been so successful. According to the FII Intermedia 2015 Tracker Survey dataset, there are only 0.08% of adults are

using Mobile Money. 0.08% compares to a population of around 178m people, demonstrating far less penetration compared to the Kenyan market.

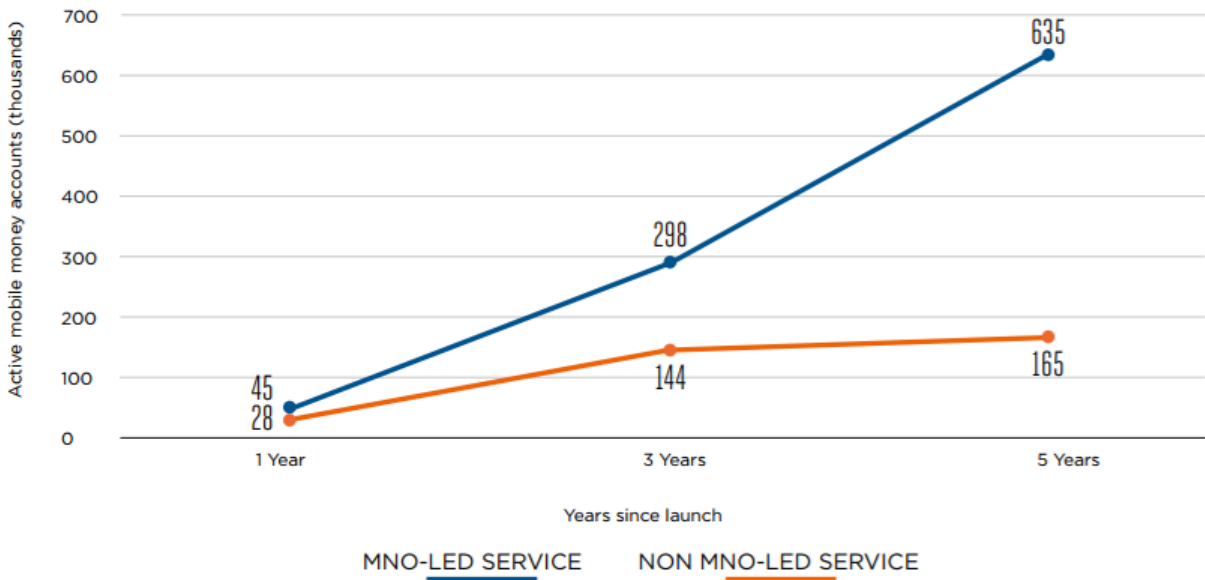
5.3.1. Policy Recommendations

The primary cause for the slow take-up of Mobile Money is undoubtedly attributed to the actions taken by the Nigerian Central Bank (NCB)(Kendall, J. 2012). The NCB has followed a ‘bank-led’ model where they have licensed banks to operate Mobile Money rather than the telecommunication companies. The reason for the bank-led model in Nigeria has been partly for protectionist reasons, to avoid money laundering and due to concerns about a loss of control. The NCB has put substantial legislation on the Mobile Money industry making the Nigerian regulatory environment far less attractive to private companies.

FIGURE 11:

ACTIVE MOBILE MONEY ACCOUNT GROWTH FOR MNO- AND NON-MNO-LED SERVICES

Active mobile money account growth for MNO- and non MNO-led services



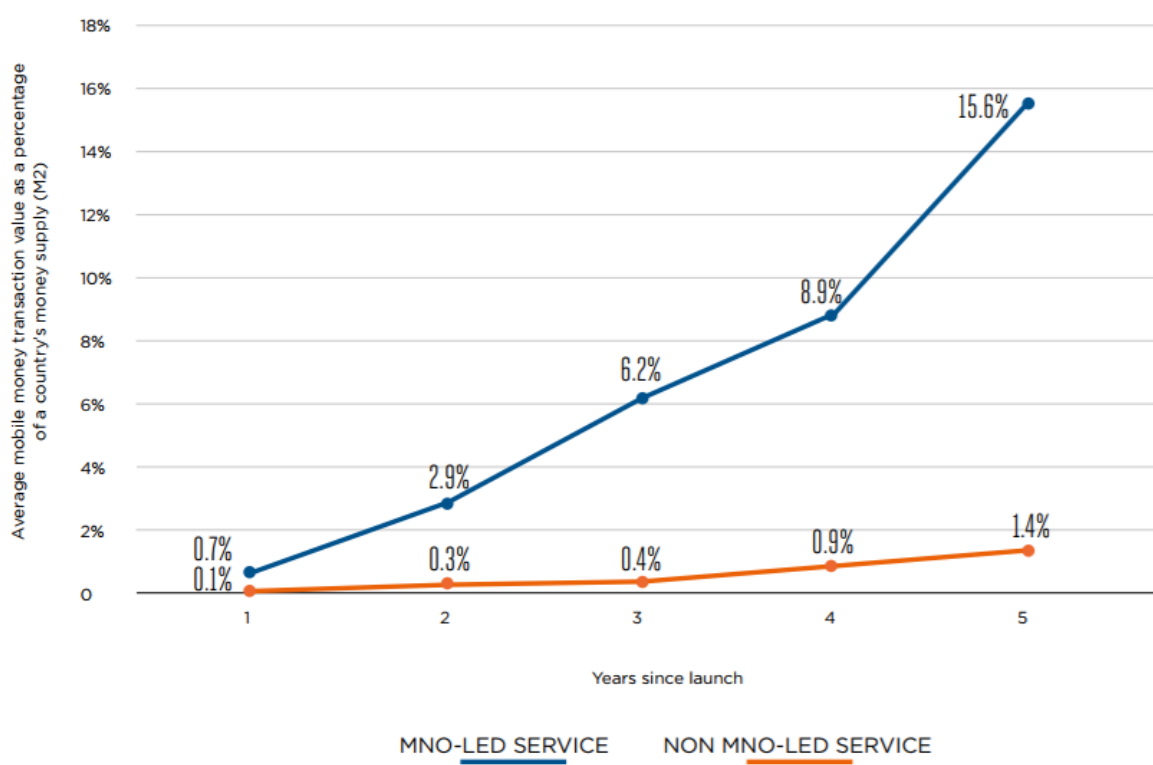
Source: GSMA: Success Factors for Mobile Money Services

Telecommunication companies operating in Nigeria are restricted, thus unable to provide the infrastructure for Mobile Money, through which bank services are offered. Nigeria has proved less attractive to the telecommunication companies and has given them less incentive to

develop the technology and infrastructure in Nigeria. Additionally, the local has become unincentivized to create an MM roll-out, because an MM roll-out would compete with some of the banks existing products that target the BOP. Lastly, the Banks do not have the distribution capabilities that the MNOs have, which means it would require the banks to put forth capital to deploy an MM infrastructure.

FIGURE 12: GROWTH OF AVERAGE MOBILE MONEY TRANSACTION VALUE FOR MNO-AND NON-MNO-LED SERVICES

Growth of average mobile money transaction value for MNO- and non MNO-led services



Above, in figure 5.2 we see the different growth rates of mobile money transactions when a Mobile Network Operator is leading the effort, and a non-MNO such as the Central Bank of Nigeria is leading the effort.

The implementation methodology between the two countries paints a stark comparison. The Nigerian government is slow, unmotivated and less efficient than the private sector in instituting financial services to the masses (Kendall, J. 2015). Nigeria is ripe for a re-launch of the Mobile Money industry, however, this time the private sector should lead it: Mobile Network Operators. The Mobile Network Operators seem to understand their customer and the fundamental

dynamics around a product launch in Africa. Nigeria's financially excluded need to be educated about the financial services available at their fingertips so they can decide as to whether they want to continue to remain excluded or included. Nigeria now needs to catch up; otherwise, the unbanked population will be suffering the consequences of not having essential financial services for years to come.

5.4 Recommendation's for Future Research

Environmental, cultural, political, regulatory, economic and infrastructural factors have an impact human behaviour; although there are many similarities between Kenya and Nigeria, there are also many differences, especially in the factors above. It would be noteworthy to study the degree to which any of these factors can be identified and contributed to the massive differential in usage statistics.

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Appendices

Label	Question	Values	Type
DG1	Age/ What year were you born?	n/a; 999=DK Refused	Numeric
DG2	Is the respondent male or female?	1=Male; 2=Female	Single
DG4	What is your highest level of education?	See table in appendix (DG4)	Single
FF1	Do you have personal a bank account that is registered in your name?	1= Yes; 2= No	Single
MM1	Have you ever heard of something called mobile money?	1= Yes; 2= No	Single
FL4	What or who do you depend on most for financial advice?	See table in appendix (FL4)	Single
MM38_3	Have you ever experienced and of the following issues with any mobile money agent? Agent did not have enough cash or e-float to perform a transaction?	1= Yes; 2= No	Single
M38_13	Have you ever experienced any of the following issues with any mobile money agent? Agent asked for my PIN number.	1= Yes 2= No	Single
MT1	How many people in your household have a mobile phone?	n/a; 999=DK/refused	Numeric
MT2	Do you personally have a mobile phone?	1= Yes; 2= No	Single

Label	Values
DG4- Level of Education	<ol style="list-style-type: none"> 1. No formal education 2. Primary education not complete 3. Primary education complete 4. Some secondary 5. Secondary complete 6. Secondary vocational training/ some certificate 7. Secondary vocational training complete/ certificate complete 8. Some diploma 9. Diploma complete 10. Some college/ university 11. Complete university degree 12. Post grad university degree 13. Koranic school 14. Other 15. DK/Refused
Label	Values
FL4- Where do you receive your financial advice	<ol style="list-style-type: none"> 1. Spouse 2. Bank 3. Insurance Company 4. MFI 5. SACCO 6. Merry go round 7. Church or Mosque 8. Family, friends 9. Radio 10. TV, News Papers 11. Big Adverts, billboards 12. Leaflet from a financial institution 13. NGO workshop 14. Local government 15. Internet 16. Supernatural being 17. Other 18. Myself only 19. DK/ Refused

Appendix A: Terms and conditions associated with the use of the datasets

- 1) The FII data and materials are copyrighted property of the Bill & Melinda Gates Foundation (the BMGF). The signatory agrees not to sell or transfer FII data to other individuals or organizations who are not covered by this Data Request Form.
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