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FINANCIAL INCLUSION VIA MOBILE MONEY SERVICES IN GHANA: DRIVERS AND THE ROLE OF REGULATION

BY

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DECLARATION

I, MICHAEL KODOM, the author of this thesis, declare that with the exception of the references, which are duly cited, I solely conducted this thesis, which is titled 'Financial Inclusion via Mobile Money Services in Ghana: Drivers and the role of Regulation' at the Institute of Statistical, Social and Economics Research (ISSER) from 2015 to 2019. This thesis has never been presented either in part or complete for the award of a degree in this University or elsewhere.

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We, the undersigned supervisors, certify that this is an original work, which we supervised the candidate to produce. We are also convinced that this thesis meets all required standards set by the University of Ghana for an award of a Doctor of Philosophy Degree.

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DEDICATION

I dedicate this work to my lovely wife, Perpetual Nancy Baidoo Kodom

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ABSTRACT

Mobile money (MoMo) has witnessed significant increase in adoption since its inception into the Ghanaian financial market in 2009. Available statistics by the Bank of Ghana show that between 2012 and 2017, the number of registered MoMo customers increased by 534%, and active MoMo customers increased by 3,119%. With this performance, it is expected that MoMo will drive financial inclusion by not only providing users with a service to make money transfers but graduating them to use other forms of formal financial services such as savings, credit and insurance. However, little evidence currently exists on the relationship between MoMo adoption and the use of formal financial services nor on the role of Central Bank regulation in facilitating MoMo deployment and adoption. For financial inclusion purposes, it is also imperative to understand the factors driving or inhibiting MoMo adoption among groups who are mostly financially excluded.

This study was conducted to examine the conditions facilitating the adoption of MoMo as a tool for achieving financial inclusion. The specific objectives were to: examine the drivers of MoMo adoption and how they vary with the demographic characteristics of the individual; assess the extent to which MoMo serves as a gateway to the use of formal financial services; and explore the role of Central Bank regulation in facilitating financial inclusion in Ghana. The 2014 and 2017 World Bank Global Findex survey datasets were used. In addition to these secondary data, primary data were collected using mixed methods. A survey was conducted across the country to gather information on the drivers of MoMo adoption. In addition, in-depth interviews with five institutions were conducted to assess the role of regulation in facilitating financial inclusion in Ghana.

The results of probit analyses showed that the main drivers of MoMo adoption were perceived usefulness, social influence and cost of transaction. Perceived usefulness and social influence had a positive effect on adoption, but cost of transaction reduced the probability of adoption. These factors were found to vary significantly with gender, age, education and the locality of residence of respondents. The results of a recursive bivariate probit regression analysis also showed that MoMo serves as a gateway to the ownership of an account at a financial institution. It also enhances chances of saving, but only through the MoMo wallet, not in formal financial institutions. MoMo users were more likely to obtain credit, but not from a formal financial institution.

Information from the interviews revealed that a change in the initial Central Bank regulation from a restrictive bank-led approach to a liberal telco-led approach was key to bringing clarity and to providing service providers with an incentive which encouraged them to make the necessary investments critical for enhancing growth in the MoMo financial market. Despite the remarkable performance of MoMo in the financial market, users continue to face network challenges. In addition, the persistent incidents of fraud and other abuses in the system inhibit adoption and use.

Bank of Ghana should take steps to identify and understand the trends and dynamics of these fraud cases in order to make policies to contain them. The activities of the telcos and their agents need to be periodically audited to ensure that they comply with the regulations. Reduction of the 2% service charges on MoMo transactions would make the service more affordable to the previous excluded. Service providers should deploy targeted services that meet the needs of the poor and the excluded to enhance financial inclusion.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACP	Africa Caribbean and Pacific
AFI	Alliance for Financial Inclusion
ASCRAs	Accumulating Savings and Credit Associations
ATM	Automated Teller Machine
BoG	Bank of Ghana
CGAP	Consultative Group to Assist the Poor
DFID	Department for International Development
EMI	Electronic Money Issuer
GCT	Ghana Chamber of Telecommunications
IDT	Innovation Diffusion Theory
IMF	International Monetary Fund
IOM	International Organization for Migration
ITU	International Telecommunication Union
KYC	Know Your Customer
MFS	Money Financial Services
MMOs	Mobile Money Operators
MNOs	Mobile Network Operators
MoMo	Mobile Money
NCA	National Communication Authority
RoSCAs	Rotating Savings and Credit Associations
TAM	Technology Acceptance Model
UNDP	United Nations Development Programme
UNIFEM	United Nations Development Fund for Women
USAID	United States Agency for International Development
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Across developing countries, the majority of people live and work in the informal sector. The sector accounts for as high as 80 per cent of total non-agricultural employment in Sub-Saharan Africa (Anyidoho, 2013) and employs 86% of all the economically active population in Ghana (Ghana Statistical Service, 2012). Despite the large size of the informal sector, a majority of the people working in the sector are underemployment, enjoy poor working conditions, uncertain work relationships and receive low wages. This makes many of them to live under high income insecurity and poverty (Osei-Boateng & Ampratwum, 2011).

Linked to the high prevalence of poverty in the informal sector is their exclusion from the formal financial system (Fafchamps, Pender & Robinson, 1995). Even though exclusion from the formal financial system is a global challenge, the picture is worse in developing countries compared to developed countries (Ouma, Odongo & Were, 2017). Globally, there are more than 2.5 billion adults who do not have any formal bank account, and most of these people live in developing countries (Siddik, Sun, Yanjuan & Kabiraj 2014; Demirguc-Kunt & Klapper, 2012). Only 41 percent of adults living in developing countries have access to a formal bank account, and in Africa, only 20 per cent of households have bank accounts (Demirgüc-Kunt, Klapper, Van Oudheusden & Zingales, 2014; ITU, 2013; Demirgüc-Kunt & Klapper, 2012).

This exclusion from access to financial services undermines the ability of the poor to overcome the barrier of poverty (Donovan, 2012). This is because they are unable to save, invest, build assets, and absorb unexpected shocks (Aker &Wilson, 2013). Low

financial inclusion has been found to negatively affect economic growth and increase the income inequality gap (Demirgüç-Kunt, Beck & Honohan, 2008).

Access to financial and payment services, including savings, credit, and social welfare transfers, facilitates improved income distribution and inclusive growth. Limited financial inclusion severely impacts financial stability, financial security, and poor people's economic mobility, thus effectively impeding the achievement of shared prosperity and development (Riley & Kulathunga, 2017). Some have explained that the main reason for low financial inclusion in developing countries is the relatively low concentration of formal financial institutions in rural areas, whilst the urban centres are usually flooded with many formal financial institutions (Collins, Rutherford & Morduch, 2009). This, therefore, limits the access of the rural folks to formal financial services. The rural poor are only able to use the formal financial services at a high cost both financially and in terms of opportunity costs (Munyegera & Matsumoto, 2014).

More often than not, financially excluded people usually employ informal and insecure ways to manage their savings and finances, such as saving monies in tin-cans or a 'money box' or in the form of grains and animals. Others also rely on associations such as Accumulating Savings and Credit Associations (ASCRAs) and Rotating Savings and Credit Associations (RoSCAs) to manage their funds (Zimmerman & Bargee, 2009; Collins, 2005; Rutherford, 2003).

There is, therefore, a global recognition that a key pillar to achieving sustainable economic growth and development is to make financial systems more inclusive (Ouma, Odongo & Were, 2017; World Bank, 2014; IMF, 2014; Demirguc-Kunt et al., 2008). The aim of financial inclusion is to enable the 'unbanked' or the formally financially excluded segment of the population have access to certain financial services such as

savings, payments, credit, transfers and insurance (World Bank, 2013). Broadening access of individuals (especially the unbanked) to financial services leads to a greater mobilization of household savings and enables them to marshal capital for meaningful investments (Triki & Faye, 2013). Studies have shown that when people are financially included, they are able obtain credit to start and expand their businesses. Others also get money to invest in their education to develop their human capital. In the long run, they are able to effectively build financial buffers to absorb unexpected financial risks and shocks (Demirguc-Kunt et al., 2015; Bruhn & Love, 2014). It trickles down to empower women and it smoothens household consumption and asset acquisition (Karlan & Zinman, 2010).

To achieve financial inclusion requires a deliberate effort targeting those segments of the population who have been excluded from accessing formal financial services for certain reasons such as location, level of income, type of economic activity or even level of financial literacy (Triki & Faye, 2013). This will require regulatory policies and institutional commitments (World Bank, 2017). As far back as 2009, there was a global call on policy makers to prioritize the financial inclusion agenda during the G20 Pittsburgh Summit (Cull, Ehrbeck & Holle, 2014). Many governments accepted the call to prioritize the financial inclusion agenda. By 2013, over 50 countries had developed national policies and established regulatory bodies aimed at achieving financial inclusion (World Bank, 2013; Alliance for Financial Inclusion, 2013).

Fortunately, technological evolution has presented many different new innovative tools and strategies that have been adopted by different countries as ‘first entry points to financial inclusion’, popular among which are ‘mobile money (MoMo), interoperable and multifunctional automated teller machines (ATMs), and prepaid debit cards for social grant programmes’ (Riley & Kulathunga, 2017, p.3). These innovations in

themselves do not necessarily guarantee financial inclusion, but the policy framework guiding the deployment of the innovations determines the level of financial inclusion a country will achieve. For instance, the ability of Thailand to extend formal financial access to 88% of households was mainly through the deliberate initiative to deploy thousands of multi-functional ATMs and automated deposit machines (ADMs) across the country as a way of enhancing access to financial services (Riley & Kulathunga, 2017). Similarly, in South Africa, the government resorted to the use of debit cards to facilitate the payment of social transfers to the poor, and this policy directive contributed to increasing the rate of financial inclusion from 63 percent in 2011 to 86 percent in 2014 (Riley & Kulathunga, 2017). The use of the debit card became an entry point for those who were previously excluded to use financial service.

Among the innovations adopted by many African countries to achieve financial inclusion is mobile money (MoMo). The rate of MoMo adoption, compared to other financial inclusion tools such as debit card and use of ATM, has shown that it is one of the surest ways of achieving financial inclusion in Africa (Lal & Sachdev, 2015; Must & Ludewig, 2010). The success story of Kenya's M-Pesa has become a model for many Africa countries including Ghana, where a greater proportion of the people do not have access to banking services. The use of MoMo technology in Kenya (M-Pesa) has increased the level of financial inclusion among the adult population to about 75 percent (Riley & Kulathunga, 2017). M-Pesa has been very successful in extending financial services to the unbanked population because between 2007 and 2009 (just two years into operation), the proportion of people using M-Pesa who have no bank account (unbanked) increased from 25 to 50 percent and the proportion of people living in rural areas using the services (who were previously unbanked) increased to 41 percent (ITU, 2013). There are over 23,000 retail outlets, which provide users with the convenience

to make their transaction as compared to about 1,000 bank branches (Klein & Mayer, 2011). M-Pesa is driving financial inclusion by providing people with a cheap tool to participate in the financial system (Jack & Suri, 2011). More importantly, it is not just only a service for sending and receiving funds, but it also enables users to save and earn interest on their savings (ITU, 2013).

The core services offered through mobile money are person-to-person (P2P) money transfer (both domestic and/or international remittances), credit/ top-up, making retail transactional payments, payment of bills, and mobile banking (Ivatury & Mas, 2008; Hughes & Lionie, 2007). Because of the ability of MoMo users to enjoy all these services, Vashney and Vetter (2002) note that the mobile phone device is now not just a device for communication but also a device for financial transactions, which is functioning like banks or debit and credit cards. More importantly, the MoMo system is cashless in nature (Pham & Ho, 2015), giving users the convenience to make or receive secure payments just with a click of a button. The adoption of MoMo is, therefore, expected to increase productivity by improving efficiency, reducing transactional and operational cost, improving financial security, creating employment opportunities and providing the enabling environment to stimulate business growth (Donovan, 2012). The performance of Kenya's MoMo system even increases the confidence of people in MoMo as the tool for achieving growth.

In 2011, when financial inclusion was measured by the Global Findex data as the proportion of the adult population holding an account with a formal financial institution, the proportion of people who were excluded was around 50 per cent. However, in 2014, when those using MoMo were added to the estimation of financial inclusion, the Global Findex data estimated the proportion of world's financially excluded adult population

at 34 percent. This clearly shows the potential of MoMo in driving financial inclusion (Demirguc-Kunt et al., 2015). In the African continent, the East African community has been largely successful in mobile financial inclusion. As of 2016, Kenya and Tanzania were the top performing countries in the East African sub-region on MoMo adoption. As of 2016, the proportion of MoMo account holders in Kenya was 67% whilst Tanzania was 61%. Only 35% of 38.3 million Ugandan population have adopted MoMo in 2016 (Malinga & Maiga, 2020).

MoMo first entered the Ghanaian market space in 2009 by MTN Ghana (Bampoe, 2009), the same year as Uganda. Since 2009, the adoption rate has been increasing. This increasing rate has been attributed to the increasing rate of mobile phone subscriptions. Available statistics show that from 2012 to September 2017, mobile phone transactions increased by 46% (from 25,618,427 to 37,445,048) (NCA, 2017). Within the same period (ending December 2017), registered MoMo accounts increased by 534% (from 3,778,374 to 23,947,437); active MoMo users increased by 3119% (from 345,434 to 11,119,376), and the volume of transactions through MoMo also increased by as much as 5340% (from 18,042,241 to 981,564,563). Within the same period, the value of transactions increased from GH¢594 million to GH¢155,845 million representing a 26,131% increase (Bank of Ghana, 2017, 2016). Comparing the 24 million MoMo account holders to the 11 million bank accounts in Ghana as of December 2017 (JoyBusiness, 2018) coupled with the increasing rate of active usage, it clearly shows the potential of MoMo to drive financial inclusion in Ghana. The increase in both the volume and the value of transactions also shows that, if well developed, MoMo can harness the untapped financial resources of the majority of Ghanaians to stimulate Ghana's economic growth.

1.2 Problem Statement

Financial inclusion has been found to be fundamental to poverty reduction and to minimizing the rate of income inequality (Moss, 2013). Ghana, over the years, has tried many approaches to extend formal financial services to the unbanked. However, the success rate has been poor given that a large segment of the population still does not have access to formal financial services (Riley & Kulathunga, 2017). The Central Bank of Ghana in its 2008 regulations on branchless banking noted that if well harnessed, MoMo can become a major tool for financial inclusion (Bank of Ghana, 2008).

Despite the performance of MoMo in Ghana, research has shown that the adoption rate among lower income groups (who are usually the financially excluded) is relatively low as compared to middle and high-income groups (Dzokoto & Appiah, 2014). Technology adoption in general and MoMo adoption in particular among the poor is usually constrained by diverse socioeconomic and technical challenges, which need to be flagged, understood and addressed if the country is bent on harnessing the potentials of MoMo to achieve financial inclusion.

The potential of achieving financial inclusion through MoMo in Ghana has been widely recognized, but there exist 'some questions and uncertainties regarding the regulatory and policy environment required to develop MoMo potentials' (AFI, 2010, p.2). Central Bank regulations define the scope within which MoMo can thrive and provide permissions and restrictions to MoMo activities in the country. Studies on MoMo and financial inclusion in Ghana (such as Osei-Assibey, 2015; Bampoe, 2015; Dzokoto & Appiah, 2014; Aker & Wilson, 2013) have usually focused on the micro-level indicators of adoption with little attention paid to how the drivers vary with the socioeconomic characteristics of the population. For financial inclusion purposes, it is necessary to understand the factors that influence or inhibit the chances of adoption

among those who are financially excluded for designing targeted policies, products and services to meet their financial needs. Also, despite the increasing attention to MoMo adoption in Ghana (e.g. Aker and Wilson, 2013; Bampoe, 2015; Dzokoto and Appiah, 2014; Osei-Assibey, 2015), most of the studies are case studies with limited geographical scope and sample sizes, and thus not nationally representative. More importantly, intra-country differences in the factors influencing adoption are largely uncharted. No study in Ghaa has also attempted to assess how mobile money adoption is graduating people, especially, the excluded segment into the formal financial system to use formal financial service such as opening bank account, save, access credit, and buy insurance.

Additionally, emerging studies in Ghana have paid little or no attention to the important role of regulations in facilitating mobile money adoption. Unlike countries such as Kenya, Zimbabwe and the Philippines who adopted a 'test and learn' approach to regulating MoMo, Ghana, like India and Sri Lanka, adopted a restrictive regulatory-led approach to MoMo (AFI, 2010). Unfortunately, evidence from both India and Sri-Lanka has shown that the regulatory-led approach is usually not effective in achieving greater financial inclusion compared to the 'test and learn' approaches (AFI, 2010) since regulators are unable to holistically perceive and address the dynamic surrounding MoMo services. Thus, technology is fast evolving, such that by the time regulators complete the process of passing a policy to regulate a financial technological tool, many new changes would have emerged, which were not captured in the policy. One issue of interest to this study is why Ghana adopted the regulatory-led approach? The initial regulation in 2008 establishing the MoMo services was revised in 2015, and even then, after only a year of implementation, the Central Bank proposed a review with wider stakeholder engagement (Eduku, 2016). Again, what is driving these regulatory

changes? Of great interest to this study is the extent to which the current regulation enables or limits the type(s) of formal financial services that can be provided through the MoMo platform.

1.3 Objectives of the Study

Mobile money can provide a stepping stone to have access to other forms of formal financial services. For that reason, it is essential to have a deep understanding of the factors and conditions that are necessary to enable the innovation to extend financial services to those who have been excluded from the formal financial system. The overall objective of this study, therefore, is, to examine the conditions facilitating the adoption of mobile money as a tool for achieving financial inclusion. The specific objectives are to:

1. Examine the drivers of mobile money adoption for payments in Ghana and how these drivers vary with the demographic characteristics of the individual;
2. Assess the extent to which mobile money serves as a gateway to the use of formal financial services in Ghana;
3. Explore the role of Central Bank regulation in facilitating financial inclusion in Ghana.

1.4 Research Questions

The specific research questions that the study seeks to answer are:

1. What are the drivers of mobile money adoption in Ghana and how do these drivers vary with the demographic characteristics of the individual?

2. To what extent does the adoption of mobile money drive users to enjoy other forms of formal financial services in Ghana?
3. To what extent is the Bank of Ghana regulation facilitating financial inclusion in Ghana?

1.5 Research Hypotheses

The study is guided by three major alternative hypotheses:

H_1: Availability of mobile money decreases the proportion of people who are financially excluded.

H_2: The drivers of mobile money adoption vary across the socioeconomic characteristics of Ghanaians.

H_3: Use of mobile money makes people more likely to use other formal financial services.

H_4: Changing regulation from a bank-led approach to telco-led approach would facilitate financial inclusion through mobile money in Ghana.

1.6 Justification for the Study

Ghana governments over the years have been making efforts to ensure inclusive development, which will enable the masses to enjoy certain basic services, among which are access to financial services. The findings of this study are expected to inform the government of Ghana and policy makers of the potential of MoMo to drive financial inclusion in Ghana.

The Bank of Ghana (BoG), which is the main regulator of MoMo, has been working closely with the National Communication Authority (NCA) and the telcos on how to make the MoMo innovation more robust to drive financial inclusion. If Ghana can achieve financial inclusion through MoMo, a lot will depend on regulations. Regulations and guidelines from the Bank of Ghana direct the operation of MoMo in Ghana. In 2008, the Central Bank issued the first guidelines for telcos in collaboration with banks to operate a MoMo payment system in Ghana. In July 6, 2015, the regulation was revised and broadened after broader stakeholder consultation with the banks, Ghana Chamber of Telecommunications (mobile operators association), payment service providers and other prospective electronic money issuers (Dowuona, 2015) with the aim of creating 'an enabling regulatory environment for convenient, efficient and safe retail payment and funds transfer mechanisms…with the potential to increase financial inclusion' (BOG, 2015, p.ii). The findings of this study are expected to inform BoG on the effectiveness of the current regulation in enhancing or inhibiting innovation, as well as to provide policy advice on how MoMo can further be developed to achieve greater financial inclusion, where users can gain access to other forms of formal financial services.

The findings and recommendations are expected to further enhance the deliberations going on between the stakeholders, which are expected to have a positive impact on MoMo technology. This is expected to lead to a revision in the policies that can enhance MoMo services to enable its users' access other formal financial services. MoMo is still evolving, and students and faculty are conducting diverse research into various areas of this technology. This study is therefore expected to contribute to the existing body of knowledge on MoMo and how it can enhance greater financial inclusion in Ghana.

1.7 Conceptual Definitions

This study revolves around two major concepts: mobile money and financial inclusion.

1.7.1 Mobile Money

There was lack of consensus on the definition of mobile money until the two-consecutive MoMo summits in 2008 and 2009[1]. The summits basically defined mobile money as any payment system transacted on mobile phones (Maurer, 2012). The International Telecommunication Union (ITU) (2013) defined mobile money as 'services whereby customers can use their mobile devices to send and receive money or to transfer money electronically from one person to another using a mobile phone and such transfers can be either a domestic transfer or international remittance transaction'. The key characteristic of MoMo transfer services, according to the ITU (2013), lies in the private nature of the transfers. Thus, transferring money from one individual to another.

More broadly, it was defined as 'a suite of financial services offered through mobile phones and other handheld mobile devices. These services can include 1) person-to-person transfer of funds, such as domestic and international remittances, 2) person-to-business payments for the purchase of a range of goods and services, and 3) mobile banking, through which customers can access their bank accounts, pay bills, or deposit and withdraw funds' (Dolan, 2009, p.5; Jenkins, 2008).

Based on the definition above, the ACP Observatory on Migration (2014) has grouped MoMo services into three categories namely 'mobile banking, mobile payments and mobile transfers' (p.6). Even though mobile banking is one form of MoMo services,

[1] The first summit Mobile Money Summit was held in May 2008 in Cairo, Egypt and the second summit was held between June 23-24, 2009 in Barcelona, Spain.

many studies wrongly use it interchangeably to refer to all categories of MoMo. Mobile banking is the type of MoMo services that people who already have accounts with formal financial institutions (usually banks) have access to and perform transactions in their account using their mobile phones. This means that mobile banking is restricted to only people who already have formal bank accounts and provides them with the convenience of accessing their bank account(s) at their own convenience through their mobile phone instead of walking to the bank building. Mobile banking is very common in developed countries (ACP Observatory on Migration, 2014).

The MoMo services which are commonly available in many developing countries are mobile payments and mobile transfer services. Mobile transfers and mobile payment services do not use bank accounts. Practically, these services create an electronic account called a mobile wallet for its users and enable users to make transactions through that electronic account which is linked to the SIM card. The account can be accessed only through the use of a personal identification number (PIN). Users credit or debit their wallet through a MoMo agent or another user (ACP Observatory on Migration, 2014).

According to the ACP Observatory on Migration (2014), 'mobile payment (also known as 'm-commerce') is a service allowing unbanked people to purchase or sell goods and services at a merchant shop/store (or remotely) using their mobile wallet through their mobile phone, instead of cash. Unbanked mobile phone users can also pay utility bills via their mobile wallet' (p.7). On the other hand, 'Mobile transfer (also known as person-to-person - P2P - or mobile remittances) is a service that allows unbanked people to send or receive small sums of money to/from any other mobile phone user (even if they are subscribed to different telephone service providers) across the country,

from urban to remote rural areas, and across international borders' (ACP Observatory on Migration, 2014, p.7).

In Ghana, the banks provide mobile banking services for clients who have an account with them. In the framework of financial inclusion, these are bank customers and are already financially included in the formal financial system. The remaining two services, mobile transfers and mobile payments, are those that seek to provide financial services to the unbanked population. These services are provided by the telecommunication industries in Ghana, through the support of the banks, and they are regulated by the Bank of Ghana.

The consensus in all the definitions of the concept of MoMo is the use of a mobile phone device to access financial services. This study adopts the ITU (2013) definition of MoMo, which broadens the idea of MoMo to include all local and international transfers done through the mobile phone devices but for financial inclusion purposes, the MoMo services of interest to this study will exclude mobile banking. Thus, MoMo in the context of this study refers to mobile payment or mobile transfer services, which are provided by the telecommunication industries in Ghana.

1.7.1 Financial Inclusion

Financial inclusion is a multifaceted concept with many conceptual definitions yet, like MoMo, the point of convergence is making formal financial services accessible to a segment of the people who were previously excluded. It has been established that for countries to reap the full potentials of financial inclusion, the concept needs to be clearly defined within the context of that country. According to AFI (2017), a national definition 'provides a basis for a shared vision, and helps in setting goals and mapping

out the framework for achieving them' (p.3). One can easily deduce the expectation of countries and the various market strategies and targets they hope to achieve from their definition. Therefore, a national definition of financial inclusion is an important guide for strategic development, which defines the country's vision on inclusion, clearly outlines the national policy objectives and defines the characteristics of the inclusion that country hopes to achieve (AFI, 2017).

Among African countries, Tanzania's Central Bank has defined Financial Inclusion as a 'regular use of financial services, through payment infrastructures to manage cash flows and mitigate shocks, which are delivered by formal providers through a range of appropriate services with dignity and fairness', (Tanzania National Council for Financial Inclusion, n.d., p.13). Nigerians consider the country to have achieved financial inclusion 'when adult Nigerians have easy access to a broad range of formal financial services that meet their needs at affordable cost' (AFI, 2017, p.3). In Burundi, financial inclusion is defined as 'permanent access by the adult population to a set of financial products and services (i) offered by formal and sustainable financial institutions, governed by adequate regulations, (ii) that are diversified, affordable and adapted to the needs of the population, and (iii) used by the latter for the purpose of contributing to the improvement of the conditions of their socioeconomic life' (Ministry of Finance and Economic Development Planning, 2014, p.6). In all these national definitions, financial inclusion can only be achieved when people have access to formal financial services, designed to meet their needs at an affordable price. Unfortunately, the Central Bank of Ghana has not provided the country with a national definition of financial inclusion, even though it has clearly acknowledged the importance of MoMo in driving financial inclusion in the country.

Aside from the national definitions, the many scholarly definitions of the concept do not vary so much from the national definitions above. For instance, Sahay, Čihák, N'Diaye, Barajas et al. (2015, p.8) simply define financial inclusion as 'access to and use of formal financial services.' It ensures that the majority of the people (if not all) have access to financial services such as 'accounts to receive income or transfers, savings accounts to store money safely and prudently, credit sources for personal or business borrowings, and insurance products to tide against bad times' (Sahay et al., 2015, p.8).

The World Bank (2014) defines financial inclusion as where those who are disadvantaged and those who are within the low-income segments have access to use and choose to use responsible and sustainable financial services at a cost affordable to them. Others have defined financial inclusion as a process or system that ensures that all the segments of the population, especially the poor and the vulnerable groups, have access to appropriate financial products and services at an affordable cost and that the process or system must be fair and transparent (Kilara & McKay, 2014; Dangi & Kumar, 2013).

Dube and Gumbo (2017) also define financial inclusion as 'the effective use of a wide range of quality, affordable and accessible financial services, provided in a fair and transparent manner through formally regulated entities. Financial inclusion takes the form of both 'banking the unbanked' and 'branchless banking' through providing access to affordable banking products to the poor (the unbanked) and removing geographical barriers for the banked' (p.12). Financial inclusion is the use of all strategies and system aimed at making 'formal financial services available, accessible and affordable to all segments of the population' (Triki & Faye, 2013, p.25).

In 2011, Consultative Group to Assist the Poor (CGAP) defined financial inclusion as 'a state in which all working age adults, including those currently excluded by the financial system, have effective access to the following financial services provided by formal institutions: credit, savings (defined broadly to include current accounts), payments, and insurance' (CGAP, 2011, p.8).

Effective access, according to CGAP, 'involves convenient and responsible service delivery, at a cost affordable to the customer and sustainable for the provider, with the result that financially excluded customers use formal financial services rather than existing informal options' (CGAP, 2011, p.8). All those who do not have any access to any formal financial service fall within the category of 'financially excluded', and these segments (the excluded) are usually characterised by low educational attainment, low financial literacy and low capability to use the available system. They are usually located in remote areas and have limited options to choose from and few providers of formal financial services (CGAP, 2011). The CGAP (2011) definition shows that financial inclusion can only be achieved when access, usage of the service and the quality dimensions of the service have been fully addressed.

Taking a cue from all these definitions, this study adopts the definition provided by CGAP, which limits financial inclusion to adults within the working age category but excludes children or the under age. This study is also looking at how the use of MoMo can expand users' access to using other forms of formal financial services such as credit, savings and insurance.

1.8 Outline of the Thesis

The entire thesis is structured into seven chapters. Chapter one is the introductory chapter of the work which contains the problem statement, objectives and research

questions as well as the hypotheses to be tested. Chapter two discusses the literature review and theoretical underpinnings of the research, the significance and conceptual definitions. Chapter three discusses the methodological approaches and philosophical orientation of the thesis. Chapter four examines the drivers of MoMo adoption and how the drivers vary with the demographic characteristics of the users. Chapter five assesses the extent to which MoMo is expanding the use of formal financial services in Ghana. Chapter six explores the role of regulation in enhancing financial inclusion in Ghana. Chapter seven provides a summary of the main findings, conclusions and policy implications.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the relevant theoretical and empirical literature that is relevant to the study. The chapter is structured into five main sections. The first section presents a review of the relevant theories guiding the study. The second section presents a review of the factors that drive MoMo adoption. The third section is dedicated to financial inclusion, and the final section looks at the role of regulation in financial inclusion. A review of some of the factors accounting for financial exclusion is also represented in this chapter. Based on the reviews, the conceptual framework guiding this study, which is derived from both the theory and the literature review, is presented and explained in the final section of the chapter.

2.2 Theoretical Review

Mobile money is both a technological or digital financial service and a financial innovation. Many theories have been propounded by different scholars since the 1960s to explain the emergence, adoption and evolution of technology on the one hand and of financial innovation on the other.

Some of the most popular technology adoption theories are the Innovation Diffusion Theory (1962), the Theory of Reasoned Action (1975), the Theory of planned behaviour (1980), the Decomposed Theory of Planned Behaviour (1995), the Technology Acceptance Model (TAM) (1986), the Extended TAM2 (2002) and the Technology Acceptance Model (TAM3) (2008). Each of these theories either focusses on the emergence and initial adoption of new technology or on the diffusion of innovation and how it evolves over time. The inability of any of the theories to

adequately explain the factors predicting technology adoption and use caused Venkatesh, Morris, Davis & Davis (2003) to postulate the Unified Theory of Acceptance and Use of Technology (UTAUT), which this study has adopted. The UTAUT is relevant to this study because it takes into account the mediating role of the sociodemographic characteristics of the individual in adopting new technology. However, it does not take into account the importance of institutions and regulation. It is demand-sided and does not take into account the role of institutions and regulations in the development of technological services. This weakness is addressed by Khraisha and Arthur (2018) Meta-theory of Financial Innovation.

Financial innovation has become a cardinal feature in the financial system of the world. Both financial and non-financial institutions are developing innovative financial services to meet global financial needs whilst remaining profitable (Sekhar, 2018). Theoretical and empirical literature on financial innovation includes the works of scholars such as Silber (1975), Levich (1985), Smith, Smithson, and Wilford (1990), Verghese (1990), Merton (1992), Levine (1997), Finnerty and Emery (2002), Tufano (2003) and Draghi (2008). Silber (1975), for instance, attempted to construct a general theory of financial innovation. His premise was that new financial instruments emerge in response to the challenges within the financial system, which result from the many constraints imposed on the banking sector. However, as expected in neoclassical theories, Silber's (1975) general theory did not take into account the important role that institutions play in the development of financial innovations.

In the absence of a single theory to explain the development of financial innovation, Poole and Van de Ven (1989, 1995) recommended that the best approach to studying areas such as innovation is to draw inference from many theories to construct a meta-theory, which to a large extent can address the diversities and complexities surrounding

it. Using Poole and Van de Ven (1989, 1995) approach, Khraisha and Arthur (2018) constructed a meta-theory to explain the financial innovation processes and to highlight the various complexities and dynamics surrounding financial innovation development.

2.2.1 Unified Theory of Acceptance and Use of Technology

This theory was propounded by Venkatesh et al. (2003), and it encompasses the tenets and variables of eight different models of technological adoption. These are the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM/TAM2), the Motivational Model (MM), the Theory of Planned Behaviour (TPB/DTPB), a model agreement between the Technology Acceptance Model and the Theory of Planned Behaviour (C-TAM-TPB), the Model of PC Usage (MPCU), the Innovation Diffusion Theory (IDT) and the Social Cognitive Theory (SCT). Synchronizing the significant predictors in each of these models, the researchers came out with four central determinants that affect the intention to adopt and use a technology. These factors are performance expectancy, effort expectancy, social influence, and facilitating conditions.

Performance expectancy measures the gains an individual will get from adopting a particular technology to perform his work. Variables used for measuring performance expectancy are: perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations (SCT). The empirical study by Venkatesh et al. (2003) found that performance expectancy is the strongest significant predictor of consumers' intention adopt a technology. Effort Expectancy is defined as the easiness or difficulty associated with the usage of a system. Variables used for measuring effort expectancy are perceived ease of use and complexity. Social influence measures the extent to which

an individual will adopt an innovation because important people around him are using the service. Facilitating conditions are the organizational and technical support infrastructures that exist to support users when they enter into difficulties when using the service. These are mainly behavioural controls. Venkatesh et al. (2003) further explain that there are certain moderating variables that explain the variable between the intention to use a service and the actual usage of the service. These moderating variables are age, gender, experience and voluntariness of use.

Like many of the earlier theories, UTAUT is only demand-sided, focussing mainly on the individual or the household. It ignores the importance of institutions and the regulatory environment in the development of technological innovations.

2.2.2 Meta-Theory of Financial Innovation Development

Khraisha and Arthur (2018) defined financial innovation as 'a process, carried out by any institution, that involves the creation, promotion and adoption of new (including both incremental and radical) products, platforms, and processes or an enabler of technologies that introduce new ways or changes to the way a financial activity is carried out' (p.4).

Financial innovation encompasses many stakeholders and actors such as the government, financial and non-financial institutions and technology companies. To a large extent, these stakeholders are either involved as innovators or inventors of financial innovation, intermediaries or users of financial innovation services (Khraisha & Arthur, 2018). Financial innovation can therefore emerge from financial institutions or from non-financial institutions that usually partners with financial institutions (Mention et al., 2014).

The factors that drive financial innovation development vary across space and time and often are mediated by the nature of the regulatory framework that exists within that geographical space at a time. Institutions also play a major role in facilitating the development of financial innovation, but the role of institutions has been given little attention in the financial innovation literature (Khraisha & Arthur, 2018). The meta-theory postulated by Khraisha and Arthur (2018) consists of four development theories which are considered the building blocks for explaining financial innovation development: the life-cycle theory, the economic theory, the evolutionary theory and the institutional theory. In the context of this study, the attention is placed on the economic theory, the evolutionary theory and the institutional theory, which are relevant to explain the complexities in MoMo adoption and use.

2.2.2.1 The Economic Theory

According to the economic theory, 'the demand and supply of financial innovations are the results of market players trying to overcome limitations such as transaction costs, information asymmetries, and other forms of market frictions in addition to the profit motives of the shareholders' (Khraisha & Arthur, 2018, p.16). Studies have shown that financial innovation emerges out of limitations within the supply and demand of financial services as well as limitations from market players (Duffie & Rahi, 1995; Harris & Ravi, 1989; Ross, 1989). On the demand side, research has shown that, sometimes, households need financial tools to save, borrow and build assets (Khraisha & Arthur, 2018). Firms may also demand financial innovation as a way to mitigate against risks and reduce tax obligations. These demands can lead to the emergence of financial innovation. Silber (1983) also explains that financial innovation can emerge as a response to firms' decision to accelerate their growth. Thus, the economic model

is able to explain those who demand financial innovation (who are individuals and firms) and the conditions under which they demand such services.

On the supply side, Awrey (2013) explains that the main motivation for financial intermediaries to innovate is for them to maintain their monopoly in the market. This is usually done by the provision of differentiated innovative financial products (Tufano, 2003) or by increasing the level of complexity of the products and services they offer the market (Khraisha & Arthur, 2018).

2.2.2.2 Evolutionary Theory

The evolution theory explains the selections, variations, optimizations and self-organizations of innovations (Poutanen, Siira & Aula, 2016). Firms always try to maximize their returns and, hence, they will always search or develop new innovative ways to achieve optimization (Kauffman, Lobo & Macready, 2000; Ben-Horim & Silber, 1977). The evolution theory therefore assumes that there is always a range of possibilities or a set of feasible solutions available to firms (Loreto, Bagnoli, Calfapietra et al., 2014). To arrive at an efficient innovative solution to maximize returns requires a great deal of trial and error. The evolution theory also entails the concept of natural selection, which is essential to financial innovation. The survival and diffusion of a new financial innovation over time is dependent on many factors, principal among which is an increasing rate of adoption (Bettzüge & Hens, 2001), which, among other things, is dependent on the security features of the innovation (Johnston & McConnell, 1989).

In the classical innovation diffusion model, Rogers (1995) postulates that an individual goes through five different stages of evaluation before adopting an innovation. The first stage is the awareness stage, which is influenced by the individual's personality traits

(Wood & Swait, 2002), the socioeconomic characteristics of the person and accessibility to agents that can facilitate the person's decision-making, such as media (Bandura, 2001). After the person has become aware of the existence of such innovation, the next stage is the persuasion stage. This stage is largely influenced by the volume and quality of knowledge the person gains about the innovation, which is key to influencing the judgment the person make about the innovation. This knowledge pushes the person to the third stage, which is the point when the decision to either adopt or reject the decision is made. The fourth stage is when the individual takes steps to implement the decision made. The final stage is both a confirmation and an evaluation stage on the outcome of the steps that were taken, and the results will either cause the person to continue using the product or stop using it (Rogers, 1995).

After adoption, Rogers (1995) provided a model to explain how the adoption of an innovation spreads within the population. In his model, the diffusion of innovation within a given population is dependent on the attributes of the innovation itself, the various communication channels, the social systems, and the time period. Five key attributes of an innovation, according to Rogers (1995), influence its adoption and spread are: compatibility, complexity, relative advantage, trialability, and observability. Compatibility is how an innovation fits into an individual's existing way of life. Complexity describes the perceived difficulty in the innovation or, in using the innovation. Relative advantage is the benefit the user stands to gain compared to other similar innovation. Trialability is how accessible an innovation is to a potential user who wishes to try it out. Observability is the availability and visibility of the innovation to the potential user. Rogers (1995) hypothesized that adoption and diffusion of innovations is rapid if the innovation is compatible to an individual way of life, if it is easy to use, is easily accessible to be tried, is more beneficial to the person than other

innovations, is easily available, and the features are visible to the people. In the context of MoMo payment, people will more easily adopt the innovation if they find it to be compatible to their way of life. Thus, those who are more conversant with the mobile phone application are more likely to adopt it than those who are not. Similarly, those who perceive it to provide them with a relatively higher advantage are more likely to adopt it.

The second component of/in the diffusion of an innovation is the channel of communication. According to Rogers (1995), the mechanisms by which an information about an innovation is circulated within a population is very crucial to the adoption of the innovation. There are various communication systems that influence innovation diffusion and one of such systems, according to Rogers, is peer influence. The third component is the social system, which refers to the influence from the individual's environment. According to Rogers (1995, p.23), the social system is 'a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal'. Some elements of the social system are the workplace, organized groups (e.g. trade union, advocacy groups), and even other informal groups who share common goals (Straub, 2009).

Finally, Rogers (1995) categorized adopters into different time frames. According to him, there is always some small segment of the population who usually adopt the innovation first, and he called them innovators. They are usually young literates, risk takers, and who belong to the high socioeconomic class. The second group is the early adopters, who have similar characteristics to the innovators. The next group is the early majority and the late majority, who assess the performance of the innovation before adopting it. And finally, there are the laggards, who are usually traditional and are averse to change.

2.2.2.3 Institutional Theory

The institutional theory explains how the development of financial innovations is influenced by institutions and changes within those institutions. Financial innovations could emerge from both financial and non-financial institutions. Ross (1989) and Boot and Thakor (1997), for instance, found that in a universal banking system, financial innovation is less likely compared to a situation where there is segregation in the financial system. Institutions are, therefore, critical to the emergence and diffusion of innovations. According to Bhatt (1987), assurance from the institutions builds users' trust in the service, since they may lack the knowledge and even the capabilities of conducting a proper and accurate assessment of the emerging financial innovation.

Central to the institutional theory is regulation. According to Khraisha and Arthur (2018), regulation can drive or inhibit financial innovation. For instance, where the regulation prohibits financial institutions from engaging in certain financial activities, they will find innovative ways of providing certain services in order to maintain their profitability and competitiveness in the financial market. On the other hand, financial regulation can serve as an enabler to encourage market players to introduce financial innovations that are beneficial, cost-effective and can increase their market share, such as MoMo. It drives development and gives direction to financial innovation (Khraisha & Arthur, 2018). In general, the institutional theory helps to explain cross-regional and national difference in financial innovation. This is because institutional structures (such as the number and spread of financial institutions) and financial regulations differ across regions (within a country), and across countries, respectively.

2.3 Drivers of MoMo Adoption

Several empirical studies have been conducted to assess the determinants of MoMo adoption. Most of the studies have found that the intention or actual adoption of MoMo service is influenced by so many factors, some of which have been predicted by technology adoption theories. In addition to these variables, the studies have found adoption to be moderated by demographic characteristics such as age, gender and education (Venkatesh et al., 2003; Maduku, 2013). This section begins with a review of the demographic characteristics that mediate adoption.

2.3.1 Demographic Characteristics

Among the many demographic characteristics, this section focusses on gender, age, education, income, and locality of residence.

2.3.1.1 Gender

Research has shown that males are more adventurous and inclined to be early adopters of financial innovations as compared to their female counterparts (Jambulingam, 2013; Amin, Hamid, Tanakinjal & Lada, 2006; Wan, Luk & Chow, 2005; Akinci, Aksoy & Atilgan, 2004). Males are also found to be more highly innovative than females (Demirci & Ersoy, 2008). This, therefore, makes them more likely to be early adopters of financial innovation than females. Empirical studies have established that women tend to be more anxious/cautious toward the adoption and use of new technologies, especially, at the early stages, and this affects their adoption attitude (Lee, Hsieh & Hsu, 2011; Shin, 2009). Wang, Chen and Chen (2017) also found gender to be a significant moderator of technology adoption in China. Gender emerged as a significant moderator in particular when assessing the relationship between perceived ease of use, enjoyment and intention to use a printing technology.

Whilst many studies have found gender to be a significant moderator of technology adoption, others have found no significant moderating effect of gender on financial innovation adoption and use. Empirical studies conducted by Hernández, Jiménez and José Martín (2011), Lee et al. (2011) and Nysveen, Pedersen and Thorbornsen (2005) did not find the moderating role of gender to be statistically significant in determining the attitude towards adoption and use of technology. According to Chawla and Joshi (2018), culture, however, has a significant effect on the level of involvement of females in financial decisions. Using India as a case study, they found that in most rural communities, males are encouraged to engage in financial activities right from their childhood whilst females are relegated to the background. Being a male therefore gives a cultural advantage to adopt financial tools early as compared to being a female.

2.3.1.2 Age

Literature on technology adoption has shown that the attitude towards the adoption of technology varies across the three main age categories: youth, adults and aged. According to Chawla and Joshi (2018), older people usually prefer the traditional face-to-face financial transactions rather than to adopt a new technology to perform their financial transactions. Old people usually have a lot of scepticism about financial innovations as compared to the youth (Lee et al., 2011; Demirci & Ersoy, 2008; Porter & Donthu, 2006; Morris & Venkatesh, 2000). The low adoption among the older generation is mainly because old people have limited expertise in the use of mobile phones, computers and internet (Porter & Donthu, 2006). Further research has also shown that there is a high probability for older people to feel unsure and uneasy in using technology-based financial services as compared to the youth (Demirci & Ersoy, 2008).

Research has shown that the adoption of mobile financial services among the youth is high mainly because of younger people's high usage of mobile phones. Mobile phones

are accessible, portable, entertaining and have many other multimedia features and information sharing applications which meet the lifestyle of the youth (Ling, 2004). They are also affordable, easy to use and enable multi-purpose functions, like computers (Haddon, 2008; Miyaki, 2006; Davie Panting & Charlton, 2004; Lull, 2001).

Empirical studies conducted in countries like Botswana (Lesitaokana, 2016), Holland (Peters & Allouch, 2005), Norway (Ling & Helmersen, 2000), South Korea (Leung & Wei, 2000) and Australia (Carroll Howard & Murphy, 2003) have all found an increasing rate of mobile phone adoption among the youth, mainly because it is affordable, portable, attractive and presents them with many options to perform many tasks at their own convenience and within a short period of time. Similar factors were found by studies that were conducted in African countries such as South Africa (van Biljon & Kotze', 2008), Rwanda (Donner, 2005) and Burkina Faso (Hahn & Kibora, 2008). This increasing usage therefore positively influences the adoption of mobile-phone based applications, prominent among which is money financial services (MFS). Age has been found as a significant moderator to technology adoption in many empirical studies (Yi, Wu & Tung, 2005). Age is a significant moderator of users' assessment of the usefulness, cost and quality towards the adoption of MoMo services (Riquelme & Rios, 2010).

2.3.1.3 Education

Increasing levels of education have been found to be positively correlated with increasing chances of technology adoption. Rogers (1995), in his innovation diffusion model, noted that one of the main characteristics of the early adopters is higher education. Higher education increases the knowledge and confidence of people to use a technology (Riddell & Song, 2017; Im, Bayus, & Mason, 2003; Igbaria, Livari &

Maragahh, 1995), and as such early adopters of technology are more likely to be those who are highly educated.

Many empirical studies have proven Rogers' assertion and have all found that early adopters of technological innovation tend to be people with higher education and experience (Porter & Donthu, 2006; Rhee & Kim, 2004). People with low levels of education are usually constrained by barriers of low knowledge and expertise to using technology (Liebermann & Stashevsky, 2002). According to Weijters, Rangarajan, Falk and Schillewaert. (2007), people who have higher levels of formal education are usually exposed to certain technologies such as computers and internet, whether as part of their learning process, work or in their daily activities. Empirical research in Nigeria and Ghana has shown that the higher one's education, the more likely one is to adopt MoMo services (Dzokoto & Appiah, 2014; Osei-Assibey, 2015; Onyia & Tagg, 2011).

2.3.1.4 Income

There are many studies across different spaces that have found a positive correlation between income and adoption of financial innovation. A study by AbuShanab and Pearson (2007) in Jordan found the chances of adopting e-banking to be highly associated with higher income levels. The probability of those within higher income quintiles to adopt e-banking was found to be higher mainly because they want convenient access to their incomes. A similar result was found by Kolodinsky, Hogarth, and Shue (2000). They found the likelihood of those within the highest socioeconomic wealth quintile to adopt e-banking was higher than those within the lower income quintile. Most of the people with higher incomes were also found to have higher education. In South Africa, Singh (2004) also found that people within the higher income bracket are more likely to adopt financial innovation than those within the lower income bracket.

However, a study by Domeher, Frimpong and Appiah (2014) found no significant relationship between income and the probability of using a financial innovation in Ghana. They explained that adoption of a financial innovation is not dependent on income alone but an interplay between income and other variables like education. Therefore, someone may have a higher income but may be illiterate, and this may affect his or her ability to use financial innovations like e-banking.

All the above demographic characteristics are usually not assessed in isolation. They are usually assessed together. Recent studies in Saudi Arabia and Tanzania both found that individual demographic characteristics such as age, educational level and income level have a significant moderating effect on the adoption of mobile financial services. Gender, however, did not have any significant moderating effect on mobile financial service adoption in both studies (Alkhaldi & Kharma, 2018; Abdinoor & Mbamba, 2017). Some studies have found some association between marital status and mobile phone-based application whilst others have found no such association. For instance, some studies have found that married people tend to adopt mobile financial services as compared to those who are single (Stavins, 2001; Katz & Aspden, 1997). Others have found no significant association between marital status and the adoption of mobile financial service (Gan, Clemes, Limsombunchai & Weng, 2006).

Some empirical studies have found a positive association between locality of residence and MoMo adoption. A study by McKay and Kaffenberger (2013) found that people living in urban areas are more likely to adopt MoMo as compared to people living in rural areas. Balan, Ramasubbu, Prakobphol, Christin and Hong (2009) attributed the low adoption rate in rural areas to structural and technical rigidities such as lack of network coverage, which is one of the main facilitating conditions necessary to influence adoption.

2.3.2 Theoretical Determinants of MoMo Adoption

One of the most popular theories of technology adoption, which is often used to study MoMo adoption is Fred Davis' (1986) Technology Acceptance Model (TAM). The foundational tenets of the theory were adapted from Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA) and Ajzen's (1985) Theory of Planned Behaviour (TPB). Davis tailored the propositions of these theories in the context of technology acceptance and actual usage (Olushola & Abiola, 2017).

According to TAM, one can explain the intention of an individual to adopt or reject a particular system or technology by the user's motivation, which is directly influenced by the features and capabilities of that system. The intention of a user to accept and use a technology is considered to be influenced by two major factors, namely: perceived usefulness and perceived ease of use, with perceived ease of use having a direct influence on perceived usefulness. Perceived usefulness is the perceived impact of using the technology in improving performance whilst perceived ease of use measures 'the degree to which a person believes that using a technology will be effortless' (Davis, 1989, p. 320).

Venkatesh and Davis (2000) extended the original Technology Acceptance Model (TAM2) by adding two determinants: social influences and cognitive instrumental processes to perceived usefulness and perceived ease of use as a significant determinants of technology adoption. Social influence processes comprised subjective norm, voluntariness, and image. In TRA, Fishbein and Ajzen (1975) defined subjective norm as a 'person's perception that most people who are important to him think he should or should not perform the behaviour in question' (p. 302). In the case of subjective norm, a person's acceptance and usage of technology is as a result of the influence from other people, but for voluntariness the person adopts the technology by

his own will. Venkatesh and Davis (2000) used it as a moderating factor for subjective norm. Within social groups, individuals usually engage in certain behavioural practices in order to make or maintain a certain level of favourable image within the group. According to Moore and Benbasat (1991, p. 195), image is 'the degree to which use of an innovation is perceived to enhance one's status in one's social system'. In TAM2, subjective norm was theorized to have a positive influence on image because members consider the performance of a behaviour, such as using a particular system, to have a positive impact in elevating their role or standing within that group (Venkatesh & Davis, 2000).

Besides social influence, four cognitive instrumental factors related to perceived usefulness were found to have a positive impact on technology adoption: 'job relevance, output quality, result demonstrability, and perceived ease of use (Venkatesh & Davis, 2000, p.190). They explained that the usefulness of an innovation lies in the cognitive assessment a person makes on the capabilities of a system to enhance work output. The job relevance measures the applicability or support of the system to the work. Output quality also measures the kind of task the system can perform and whether those tasks conform to the existing nature of work the potential adopter does. Result demonstrability is the tangible outputs/outcomes of the system in the performance of work, and ease of use is the degree of effort needed to use the service.

Venkatesh and Bala (2008) developed Technological Acceptance Model further in TAM3 to place much weight to perceived ease of use. The theoretical basis of TAM3 rest on four factors, which the scholar considers as a synthesis from all the previous works that have test the original technological acceptance model. The four factoes are: system characteristics, individual characteristics, social influence and other facilitating conditions (Howard, Sakyi-Dawson, Harford & Aba, 2010). TAM3 was, however,

criticised for having too many variables and relationships for predicting technology adoption.

Studies that have tested the original TAM have found that behavioural attitude to the adoption or rejection of a given technology is not only predicted by the two major factors proposed by Davis (1989), but other factors are equally significant in predicting attitude towards adoption. Even though TAM did not include attitude as a determinant of technology adoption, some studies that have included it in addition to perceived usefulness and perceived ease of use found attitude to be a significant predictor of intention to use a technology (Hussein, 2017; Altawallbeh, Soon, Thiam & Alshourah, 2015; Sujeet & Jyoti, 2013; Ahmed, Kamal, Nik Suryani & Tunku, 2011). Some of other variables that have been found to significantly influence technology are perceived security (Azadavar, Shahbazi & Teimouri, 2011), perceived risk (Koenig-Lewis, Palmer & Moll, 2010) and social influence (Echchabi & Olaniyi, 2012; Malhotra & Galletta, 1999) which are documented to have a positive influence on attitude and behavioural intention, respectively.

In the context of MoMo adoption, Kim, Shin and Lee (2009) found trust in the service to have a positive impact on adoption. Trust was conceptualized as a psychological expectation that a trusted party will not behave opportunistically. Khraim, Shoubaki and Khraim (2011) also found self-efficacy, trialability (degree of experience before adoption), compatibility, complexity, risk and relative advantage to affect consumers' adoption of mobile financial services. Tanakinjal, Deans and Gray (2010), who explored the potential factors that may influence the intention of mobile phone users to adopt mobile financial services, found that seven perceived characteristics play an important role in determining consumers' intention to adopt MoMo. These are: relative

advantage, compatibility, complexity and trialability, perceived risk, trust and permissibility (Tanakinjal et al., 2010; Brown et al., 2002). Others have also found some demographic characteristics of people such as gender, age, education, experience/capabilities to use the service, level of training and the compatibility of the innovation to the existing way of life to have a positive impact on adoption (Park, 2009; Chuttur, 2009; Burton-Jones & Hubona, 2006; Venkatesh & Morris, 2000; Karahanna, Straub & Chervany, 1999).

Like TAM, since the proposition of the Unified Theory of Acceptance and Use of Technology Model (UTAUT) by Venkatesh et al. (2003), other scholars have tested the theory in different context and settings. For instance, Abrahãoa, Moriguchi and Andrade (2016) tested the UTAUT in a survey to examine the intention of adoption of mobile payment in southeastern Brazil. Using structural equation modeling, they found that the individual's behavioral intention to adopt mobile payment system can be explained by factors such as perceived risk, performance expectation, social influence and effort expectation. Perceived cost was not found to be a statistically significant predictor of mobile payment adoption.

Oliveira, Thomas, Baptista, and Campos (2016) also assessed the determinants of customer adoption of mobile payment service in Portugal by combining the extended unified theory of acceptance and use of technology (UTAUT2) with the innovation characteristics of the diffusion of innovations (DOI) theory. Using structured equation modelling, the results of their analysis showed that 'compatibility, perceived technology security, performance expectations, innovativeness, and social influence have significant effects on the adoption of mobile payment and the intention to recommend this technology' (p.404). Users of MoMo were also found to signficantly recommend the technology to other users through their social network and other

comunication channels, hence the need for providers to exploit the potentials of social media platforms to the market of MoMo services to increase adoption.

2.4 Growth in MoMo Service in Ghana

The majority of Ghana's population, as in many other developing countries, do not use any formal financial services like banks or credit unions. Before the inception of MoMo in the Ghanaian financial market, people transferred money to their relatives through bus drivers, and they were usually charged high fees as commission before the funds could be transferred (Bampoe, 2015; Tobbin, 2012). Unfortunately, the high fees paid did not always guarantee that the money would reach the intended destination safely. There were always several and varied issues of disappointments, such as the frequent breakdown of vehicles, attack of vehicles by robbers, and late delivery of funds, among others (Tobbin, 2012). The MoMo payment system was therefore embraced because of its advantages of convenient, secure and less costly transfers as compared to the traditional method.

In the current MoMo landscape, Mobile Money Operators (MMOs), who are mainly profit-maximizing entities, issue the electronic money and the money is stored by the banks, who issue the physical money to customers. Thus, the electronic money the MMOs issue to customers is backed by equivalent physical money held by the Central Banks. Whilst the Bank of Ghana regulates and supervises the entire MoMo activities, the National Communication Authority (NCA) supervises the security of the data the mobile network operators (MNOs) collect about their customers as well as the integrity of the technologies the MNOs use (Bank of Ghana, 2017). The MNOs help customers to convert cash to electronic money and vice versa. They have many agents across the

country who assist this process. There are currently some banks who have successfully linked their customers' accounts to their MoMo wallet to enhance the convenient use of the banking service (Bank of Ghana, 2017).

The Bank of Ghana in its regulations to Banks and Savings and Loans Companies in 2008 underscored the need to encourage mobile payment, believing that it can be used to substantially increase financial services outreach to the unbanked communities in Ghana. As part of its strategy to create an enabling regulatory environment to promote MoMo payment systems in Ghana, Bank of Ghana noted that 'financial institutions cannot take on branchless banking without the help of other market players like telecom companies, technology service providers, agents etc.' (Bank of Ghana, 2008, p.1). Therefore, telecommunication industries can partner financial institutions to provide branchless banking services to the unbanked.

After Bank of Ghana released these guidelines, the leading telecommunication industries in Ghana such as MTN, Vodafone, and AirtelTigo have made conscious efforts to deploy MoMo service to all Ghanaians, both in the formal and the informal sectors. Following the 2008 regulation, in July 2009 (almost a year later) MTN launched its MoMo service in the country. In March 2010, Airtel also commenced MoMo operation and Tigo followed suit with its 'Tigo Money' service in October 2010. Vodafone jumped into the MoMo market with 'Vodafone Cash' in July 2015 (Saliu, 2015).

Available statistics by the Bank of Ghana show that MoMo subscription and active users are increasing consistently annually. In the same vein, the volume and value of MoMo transaction is equally increasing. From the Table 2.1, between 2012 and 2017, the number of registered MoMo customers increased by 534% (from approximately 3.8

million to 24 million). The data further revealed that the number of active MoMo customers increased by 3,119% (from 345,434 to 11.1 million customers). Within the same period, whilst the total volume of MoMo transactions increased by approximately 5,340%, the value went up to as high as 26,131%. The balance of float (which can be regarded as the savings people had in their account) increased from GH¢19.6 million to as high as GH¢2,321.1 million. These statistics clearly show that Ghana is witnessing an increasing annual adoption of MoMo service, and it is clear that MoMo has the potential to drive financial inclusion.

Table 2. 1 Performance of MoMo in Ghana

Indicator	2012	2013	2014	2015	2016	2017
Registered MoMo customers (cumulative)	3,778,374	4,393,721	7,167,542	13,120,367	19,735,098	23,947,437
Active MoMo customers[2]	345,434	991,780	2,526,588	4,868,569	8,313,283	11,119,376
Total volume of MoMo transactions (annual)	18,042,241	40,853,559	113,179,738	266,246,537	550,218,427	981,564,563
Total value of MoMo transactions (GH¢ million)	594.12	2,652.47	12,123.89	35,444.38	78,508.90	155,844.84
Balance on Float (GH¢ million)	19.59	62.82	223.33	547.96	1,257.40	2,321.07

Source: BoG Payment Systems Report 2016 and 2017

The astronomical growth in the number of MoMo subscribers and active users, the volume and value of MoMo transactions have made operators think about finding new ways to widen the scope of services provided to customers (Krugel, 2007).

[2] Active customers refer to the number of customers who transacted at least once in 90 days prior to reporting

2.5 Financial Inclusion

Traditionally, ownership of an account at a formal financial institution has been used to define financial inclusion. Such an account is expected to enable people to formally make payments, save and borrow, as well as well purchase insurance (Zins & Weill, 2016). This therefore means that to be classified as financially included is to have access to a full range of appropriate financial services and products. In almost all cases, the focus is placed on the poor and vulnerable groups, who do not participate in the formal financial system because of their low socioeconomic status, as well as rigidities within the formal financial system that undermine their participation ability. Financial inclusion is therefore a process that provides appropriate financial services to the vulnerable segment of the population, through a convenient financial tool at an affordable cost (Chakrabarty, 2011).

According to Hannig and Jansen (2010), financial inclusion aims at improving access to financial services by ensuring that there are no barriers (price or non-price) to the availability and use of financial services. All the definitions of financial inclusion point to availability, accessibility and affordability of financial services to the previously excluded (Thorat, 2006). There is a growing attention toward enhancing financial inclusion, mainly because of the numerous positive socioeconomic impacts it has on reducing poverty, accelerating prosperity and sustaining national development (Ackah & Asiamah, 2014; IMF, 2014).

Promoting initiatives to enhance financial inclusion is of great concern to African countries, as to many other developing countries. This is because the structure of banking systems in Africa is less inclusive as compared to other countries outside the continent (Beck & Cull, 2015). In most countries in Sub-Saharan Africa, whilst financial sector liberalization reforms have led to an expansion in financial institutions,

most of the financial institutions tend to be clustered in the urban areas (Mlachila, Dykes, Zajc, Aithnard, 2013). This leaves many rural residents with limited access to financial services or a high cost of access. The evolution in the mobile telecommunication industry and the emergence of MoMo services have provided the unbanked with convenient, affordable access to financial services.

2.5.1 Determinants of Financial Inclusion

Many scholars have written on financial inclusion, but few have tried to examine the determinants of financial inclusion. According to Rajan (2014), no matter the initiative and tool, a country can be described as financially included if the system is able to get these five principles (5Ps) right: product, price, profit, place and production. The product should be simple, reliable and suitable to the needs of the people. The right product should therefore meet the needs of the people at the right place. Place, in this context, does not only mean the physical proximity to the people but also the electronic proximity, as in the case of mobile network coverage. To enhance financial inclusion, the price should be affordable to the poor. Thus, the transactional cost as well as the service charge should not be so high that the poor cannot afford it. Also, to enhance adoption by the majority of the people, they need to have assurance in the system that their monies will be safe from fraudsters. The regulations governing the systems should provide users with security. Whilst all these four principles address the concerns of the user, the provider also needs to provide the service at a fee that earns some minimum amount of profit to continue to provide the service. MoMo is therefore seen as the right product tool to drive financial inclusion in developing countries such as Ghana, given the wider mobile network coverage in the country, and to provide users with services that are compatible with their way of life.

In recent times, the Global Findex datasets have been used to estimate the predictors of financial inclusion. Conceptualizing financial inclusion as the likelihood of an individual to have an account with a formal financial institution, a study by Allen, Demirguc-Kunt, Klapper and Peria (2012) using the 2012 Findex data showed that globally, those within the higher income category, the highly educated, the aged, urban residents, those married or separated, and the employed are more likely to be financially included. These same factors were found to have a positive effect on the probability of an individual to save with a formal financial institution. The chances of borrowing from a formal financial institution were found to increase among those within the older age category, those with higher education, those within the high-income category and among men who are married.

Zins and Weill (2016) also analysed the same Findex data for 37 African countries to assess the determinants of financial inclusion in Africa. The results were similar to those of Allen et al (2012) where males, those within the top income category, having higher education and aged increases the chances of a person becoming financially included. Of these factors, income and education had the higher influence on financial inclusion than the others.

Fungácová and Weill (2015) also used the 2012 Global Findex but limited their study to China. They found that in China, the probability of an individual to be financially included is high if the person is old, highly educated and is within the high-income category (those considered as rich). Fungácová and Weill (2015) found that poverty, gender and age affect financial inclusion. They found that those who are poor lack money to participate in the formal financial system, and where there is another person in the family having an account, they are more likely not to engage in formal financial

service activities themselves. Some of the more educated who are not financially included also complained about the high cost and lack of trust in the formal financial system. Thus, the perceived service charges or cost associated with the formal financial service can deter some categories of people from participating in formal financial activities.

The findings of Allen et al. (2012) reinforce those of Fungácová and Weill (2015), who found that even though national level factors such as the quality and strength of institutions, the legal system and the entire stability of the country impact the level of financial inclusion, bank-specific factors such as the high cost associated with opening and operating a bank account sometimes deter people from participating in the formal financial system. In addition, many people have high distrust for the banking system, which further undermines financial inclusion.

Fungácová and Weill (2015) further found that in China, the basic documents required in the opening of accounts and accessing certain formal financial services restrict women from participating in formal financial activities. They found that lack of documentation and collateral prevent women from getting access to both formal and informal credit facilities. Distance to the nearest formal financial institution and other religious factors were found to deter the aged from participating in the financial system.

Demirgüc-Kunt et al. (2013) used the same 2012 Global Findex to examine the determinants of financial inclusion in 98 developing countries. They found gender differences in the probability to own a formal account, formal savings and formal credit. Like Fungácová and Weill (2015), Demirgüc-Kunt et al. (2013) found that women were more likely to be financially excluded compared to men, mainly because of lack of documentation to open an account and lack of collateral to serve as guarantee to access

credit facilities. Other factors that limited women's financial inclusion were low levels of financial literacy, lack of business expertise, poor credit history and other rigidities within the formal financial system. The role of financial literacy in facilitating financial inclusion was also found by Kostov, Arun and Annim (2015) in South Africa. They found that financial inclusion affects household financial decision making.

Unlike Fungácová and Weill (2015) and Demirgüc-Kunt et al. (2013), who found gender differences to exist in the use of formal financial services, an analysis by Aterido, Beck and Iacovone (2013) across nine African countries did not find any significant gender differences in access to financial services. They did find, however, that in some countries, women experienced some forms of discrimination in areas such as formal employment and formal education both at the national and household level. On the other hand, they found that women were more comfortable accessing financial services from informal sources than from the formal sources.

Recent evidence from Zimbabwe shows that some of the significant factors that facilitate financial inclusion are the existence of a wide interrupted network, cheap registration, availability of information, assurance of security of deposited funds, and a productive economy. Among all these factors, basic and cheap registration emerged as the most influential enabler of financial inclusion (Dube & Gumbo, 2017). Munyanyi (2014) and Demirguc-Kunt and Klapper (2012) both note that the purpose of financial inclusion is to provide a full range of affordable financial services to poor people, who are usually rural residents, employed in the informal sector, and minority groups. Such services must be cheap and easy for them to register. But critical in such a process is the means of identification (Dangi & Kumar, 2013).

Among other factors, one of the important factors that can influence and at the same time undermine financial inclusion is the trust that people have in the electronic service (Beldad, de Jong & Steerhouder, 2010). Many people are not used to online transactions, and hence trust in the service is essential to influence adoption and use of the service (Dangi & Kumar, 2013). Financial inclusion tools need to be affordable, reliable, easy to use, robust (Kilara & McKay, 2014; Makosana, 2014), and trustworthy.

2.5.2 Mobile Money and Financial Inclusion

The increasing use of mobile phones has increased the confidence of policy makers and practitioners in the ability of MoMo to bridge the gap in access to financial services, especially in Africa (Zins & Weill, 2016). Such bridging is expected to improve the socioeconomic outcomes of the previously financially excluded segment of the population by providing them with opportunities to save and send electronic money to friends and families at their own convenience and at a cost affordable to them. In the current situation of an alternatively affordable service, MoMo presents the excluded with the opportunity to engage in the formal financial market (Kshetri & Acharya, 2012).

2.5.2.1 Use of accounts

There are few empirical studies on the effect of MoMo adoption on the use of formal accounts. So far, the only known study which has attempted to examine the effect of MoMo on graduating people to using formal accounts is Mbithi and Weil (2014). They found that in Kenya, the adoption of MoMo (M-Pesa) increases the probability of users to be banked.

In developed countries like the United States, studies have shown that in every four households, there is at least one person who is either underbanked or unbanked. These households usually access some or all of their financial services outside the formal banking system. For the unbanked households, the majority of them have never opened a bank account. The basic and common reason usually cited to explain the lack of any bank account is lack of money to operate a bank account. They sometimes also indicate that they do not have a need for bank account (Burhouse & Osaki, 2012). Analyses from the Finscope data show that income and education are key determinants of the use of formal accounts. Thus, highly educated people within the top income quintiles are more likely to use formal banking services as compared to those who are less educated and are within the bottom income quintile (Honohan & King, 2012). A recent study by Fanta and Mutsonziw (2016) found that even in countries with high records of financial inclusion, there are still gender gaps in access to and use of formal financial services. This mainly stems from the fact that female-owned businesses face more financial constraints than the male-headed businesses (Demirgüç-Kunt et al, 2015; Henderson, Herring, Horton & Thomas., 2015; Presbitero, Rabellotti & Piras, 2014; Beck, Behr & Madestam., 2011).

Several studies have found a higher probability of people with higher education to become financially included relative to people with lower education (Demirgüç-Kunt et al, 2018) across different countries such as China (Fungácová & Weill, 2015), Argentina (Tuesta, Sorensen, Haring & Camara , 2015), India (Chithra & Selvam, 2013) and Peru (Camara & Tuesta, 2015). Those with higher education are considered to have the financial ability to hold bank accounts and they can also provide personal guarantees and collaterals needed by banks to access loans. Higher education is also linked to higher socioeconomic wellbeing (Lotto, 2018).

2.5.2.2 Effect of Mobile Money on Savings

Low financial inclusion has made the majority of the population adopt informal means of savings and managing their finances. Evidence available shows that most poor households save through grains and seeds, keeping money in tins or cans, under mattresses or in holes in the ground. Some also save through associations such as Rotating Savings and Credit Associations (RoSCAs) and Accumulating Savings and Credit Associations (ASCAs) (Zimmerman & Bargee, 2009; Collins, 2005; Rutherford, 2003). Some have attributed the continual use of informal financial sources to the inability of the formal financial system to design tailored products and services that meet the large segment of the unbanked population. The existing financial system is shrouded in complexity, with no tailored service that gives the poor people the flexibility to save at their own convenience. MoMo service meets the needs of the poor by providing them with a service which is compatible with their way of living, thereby inducing their savings ability (Ouma, Odongo & Were, 2017).

Some empirical studies have found that the adoption of MoMo induces saving among both the previously excluded segment of the population as well as the rich households (Batista & Vicente, 2016; Jack & Suri, 2014, 2011; Honohan & King, 2012; Shem, Misati, Njoroge, 2012; Mbithi & Weil, 2014; Wilson, Harper & Griffith, 2010; Collins et al., 2009; Comninos, Esselaar, Ndiwalana & Stork, 2009). Through the savings made through their MoMo accounts, Jack and Suri (2014) found that M-Pesa users are able to absorb relatively large income shocks without any significant reduction in their household consumption. These shocks, among others, include unexpected illness, loss of jobs, death of livestock and unexpected failure in harvest. On the other hand, the study found that the consumption of non-M-Pesa households falls by as high as 7% on the average any time such households experience unexpected shocks.

Other studies in Kenya have shown that the use of banking products and services accessed through the mobile phone (referred to as mobile banking) is largely restricted to people within the top income quintile (Demombynes & Thegeya, 2012). Demombynes and Thegeya (2012) found that savings through the mobile phone only is largely used by the poor, who usually do not operate any formal account. MoMo account holders (M-Pesa) were more likely to have savings as compared to non-M-Pesa account holders. They found that M-Pesa increases the likelihood of savings and the amount saved, even though the service does not give users interest on their savings. Convenience and safety drive users' savings motives as compared to interest payment. These factors were also found by Jack and Suri (2011).

Interesting to note from the work of Mbithi and Weil (2014) is that the adoption of M-Pesa reduces the likelihood of people using informal savings mechanisms. Similarly, Wilson, Harper and Griffith (2010) found that in Nairobi, informal savings groups move their savings into their M-Pesa accounts mainly because funds in M-Pesa accounts are time and cost-effective to access at their own convenience. Jack and Suri (2011) found that 90% of early adopters of M-Pesa use the service as a tool of savings mainly because of its security, privacy, ease of use and lower transactional cost.

In a recent study across four Sub-Saharan African countries (Kenya, Uganda, Malawi and Zambia), Ouma et al. (2017) found that MoMo is a financial service that promotes the likelihood of households saving as well as increasing the amount saved. They attributed the increasing volume of savings to the fact that MoMo users can deposit any amount of money they get as many times as they want into their wallet, and there is also convenience in making transactions.

Many studies have found that saving attitudes vary across the demographic characteristics of people. In terms of gender, there is a mixed finding. Becker's (1975) human capital theory shows that relative to men, women sometimes make rational decisions to invest less in their human capital development and hence they get less income and save less as compared to the males. Women tend to be more conservative because they are more risk averse than their male counterparts (Mulino & Chai, 2008).

Empirical studies from different parts of Kenya by scholars such as Mukhongo (2014), Mukindia (2012) and Njunge (2013) have all found factors such as gender, education level and wealth/income to significantly enhance rural household savings. There exists a considerable pool of literature that have found that women spend much of their income on household provisioning and meeting children's nutrition as compared to men, rather than saving to (re)invest in business. (Quisumbing & Maluccio, 1999; Handa, 1994; Cutler & Katz, 1991). Hence, the probability of males to save and the value of their savings is more likely to be higher than their female counterparts. Interestingly, Lihiku (2006) found that in Malawi, females save more than men. However, Sereetraku, Wongveeravuti and Likitapiwat (2013) found no gender difference in savings attitude among Thai students.

Njunge (2013) found age to have a non-linear relationship with savings among Kenyans. In Mozambique, Amino, Larson, Bittencourt and Graham (2003) found household savings to be influenced by the level of household income. Similarly, in Malawi, Lihiku (2006) found gender, income, dependency ratio as well as the location of household to be significantly related to savings. In Ghana, studies by Kodom (2013), Amu (2008) and Aryeetey (2004) also found savings to be influenced by certain demographic characteristics of the respondents such as age, gender, income, education

and employment status. Aryeetey (2004), for instance, found women to hold less savings than men even though they get more loans than men because of their engagement in non-farm enterprises, which required more capital. Amu (2008) found a negative relationship between age and savings among households in the Ho Municipality.

2.5.2.3 Effect of Mobile Money on access to Credit

Credit delivery is cardinal in the poverty reduction agenda of developing countries as it provides both households and firms with the capital they need to make the necessary investment that can lead to an improvement in their living and working conditions (Amponsah, 2017). Unfortunately, empirical studies from many Sub-Saharan African countries have shown that formal financial institutions are always reluctant to extend credit facility to poor households as well as to people operating micro and small businesses, mainly because they are perceived to be risky borrowers with greater uncertainty for repayment. Because they borrow in small amounts, the cost of transaction is also considered high for the formal financial institutions (Abor, 2008; Beck & Demirguc-Kunt 2006; Ofei, 2004; Bigsten, Collier, Dercon et al., 2003; Kimuyu & Omiti 2000; Aryeetey & Udry, 1997). Hence, most people are forced to borrow from informal sources at high interest rates (Steel & Andah, 2003).

In Ghana, evidence from the Living Standard Surveys (3rd to 5th rounds) show that over 75% of households access credit from informal sources, mainly from friends and family as well as from money lenders. The researches have also shown that loans from these informal sources rather hinder instead of improving the socioeconomic wellbeing of the poor because of the high interest rate informal creditors demand (Bigsten et al., 2003; Steel & Andah, 2003; Atieno, 2001). Fortunately, following the passage of the Borrowers and Lenders Act, 2008 (Act 773) and the Non-Bank Financial Institutions

Act, 2008 (Act 774) in 2008, the 5th round of the Living Standard survey found that between 2012 and 2013, as high as 51% of loans were accessed from formal and semi-formal financial institutions (Amponsah, 2017). The activities of semi-formal financial institutions such as Savings and Loan Companies have also contributed to the reduction of informal borrowing (Amponsah, 2017).

Though limited empirical literature exists on the impact of MoMo on credit access, available evidence from Kenya shows that between 2012 and 2016 when M-Shwari, an entirely new MoMo savings and loan product, was launched, the number of active customers (30-day) who had deposited and accessed credit numbered 3.9 million with a deposit of Kshs 8.1bn. This product was born out of a partnership between the Commercial Bank of Africa and Safaricom. The service enables users to move money between their M-Pesa account and M-Shwari bank savings account at no charges. Interest on loans were between 2% to 5% depending on the amount borrowed and time frame. Customers obtained relatively high interest rates on fixed deposits. M-Pesa users with six months active service usage could apply for an M-Shwari loan without paying any fee or doing any paper work. The transaction history becomes a credit score upon which loans are granted. Customers can progressively access larger loans when initial loans have been successfully repaid (Aron, 2018). In Ghana also, some financial institutions have partnered with MoMo service providers to provide short-term loans to users, such as Fido money. However, there is no known empirical study on the extent to which these services are being patronized by customers.

In terms of access to credit, women tend to be less favoured than men (Henderson et al., 2015). Other studies have also found that females are less likely to get loans (Beck et al., 2011; Demirgüç-Kunt et al., 2015) even when demographic characteristics of the individual are taken into consideration. Women tend to lack the collateral and

documentation needed to access loan (Fanta & Mutsonziw 2016); they also have poor financial literacy and low business expertise (Lotto, 2018).

2.5.3 Impact of Mobile Money on the Livelihood of the Previously Excluded

The livelihood of the unbanked is usually confronted by two challenges: high volatility in income earnings and exposure to severe shocks. Access to financial services is a solution to these challenges (Saliu, 2015). Recent studies on the impact of MoMo, especially in developing countries, have revealed that the ability of the MoMo payment system to extend financial services to the unbanked population is contributing to achieving financial inclusiveness as well as reducing poverty (Must & Ludewig, 2010). Access to financial services by the unbanked, according to Saliu (2015), can smoothen their cash flows through savings, which will serve as a buffer for unexpected contingencies, giving them the capacity to withstand temporary shortfall in income.

Data from many developing countries have proven that MoMo is a scalable initiative to provide financial services to the unbanked and a tool for reducing poverty. Mas and Morawczynski (2009) and Morawczynski and Pickens (2009) investigated the social and economic impact of the Kenyan M-Pesa system on the livelihood of the people. Their findings showed that M-Pesa has induced savings among its users, changed the remittances pattern and, improved the livelihoods of the rural poor (who are mainly finanically excluded) through the increased and secured remittances to the rural areas. Emphasizing the impact of MoMo on savings, Wolman (2012) also found that the unbanked are able to have more access to savings when they adopt MoMo. Kusimba, Chaggar, Gross & Kunyu (2013) also found that those who did not previously have any savings are able to save after they have adopted MoMo services.

Many scholars that have examined the impact of the MoMo payment system on financial inclusion have found that mobile financial inclusion can transform the livelihood and well-being of the previously excluded. Of the many scholarly works that have been conducted to examine the impact of the MoMo payment on the livelihood of users, the economic benefits of MoMo adoption dominate as compared to the social benefits. Researchers such as Ivatury and Pickens (2006) and McKay and Pickens (2010), among others, have found that using mobile phones to make financial transactions has a signficant impact in reducing the cost of transaction. The study by Morawczynski and Pickens (2009) on usage and impact of M-Pesa revealed that urban users of M-Pesa, who largely send remittances to their relatives in the rural areas, find the system to be cheap, easy to access (have agents everywhere) and more secure than all the other means of remitting funds. The authors observed that the cost of sending money through M-Pesa is 27% cheaper than sending it through the post office's PostaPay and 68% cheaper than sending it through a bus company. They also found MoMo transfers to be faster than all the other traditional means of sending money, mainly because the transactions through MoMo occur instantaneously. Williams and Torma (2007), for instance, found that mobile phone based financial transactions have decreased the amount of time a person would have used to travel to his or her bank to make transactions. Another impact of MoMo is its potential to reducing cases of theft among users (Morawczynski, 2008).

According to Jack and Suri (2011), households using MoMo are able to spread their risk because, when unexpected events occur, they are able to receive transfers within the shortest possible time at a reduced cost as compared to households who do not use MoMo. In their study, they found that the household consumption (especially those within the lower income category) drops significantly in times of unexpected negative

income shocks. Households using MoMo are therefore less vulnerable to shocks (Morawczynski, 2009). In the view of Plyler, Haas and Nagarajan (2010), the emergence of MoMo has increased the volume of capital accumulation in emerging markets and has also improved the overall business enviroment of developing countries.

Another undeniable benefit of MoMo, acording to Gencer (2011), is the job creation opportunity that it offers to people, epecially those within the low and middle income category, as they become sales agents. On the part of the World Bank, MoMo is a tool for economic growth, as it provides people with employment opportunities to earn a living and at the same time it contributes to the growth of businesses (World Bank, 2013). Expanding on the employment opportunities, evidence from Kenya's M-Pesa system has shown that through the adoption of MoMo, existing businesses have been expanded, new ones have emerged and the M-Pesa system has employed many people (Plyler, Haas & Nagarajan, 2010). In terms of direct employment, studies have found that there are over 30,000 agents that Safaricom has recruited to be MoMo agents across Kenya to operate M-Pesa shops and earn commissions on transactions by service users (Bampoe, 2015).

Still drawing lessons from Kenya's M-Pesa system, MoMo has been found to contribute towards making individuals, especially women, autonomous (Mas & Radcliffe, 2010; Morawczynski, 2009; Plyler et al., 2010; Donner & Tellez 2008). Like Ghana, Kenya has a high gender inequality gap, especially with regards to ownership and control over productive resources such as lands. This is mainly due to cultural norms and values such as the patriachical inheritance system and the ascription of men as the head of the household. Studies have established that Kenyan men control about 95 percent of the land holdings in the country (UNDP and UNIFEM, 2005). This, therefore, makes the men more economically empowered than the women, making them have greater control

over the household than their female counterparts. The women have limited sources of income to support their homes, making them economically dependent on the men (Jack & Suri, 2011; Demombynes & Thegaya, 2012).

Prior to the emergence of MoMo, men usually exercised control over the [little] income and savings that women make. The emergence and adoption of the M-Pesa MoMo system has enabled women in Kenya to manage their funds independently without seeking their husbands' permission. The system guarantees privacy, hence giving women some level of autonomy over their own savings and income (Morawczynski, 2009). This is mainly because MoMo transactions are done privately and are not visible for others to see as compared to the traditional mode of transferring funds through the post office or the bank, where they could easily be seen and reported. These impacts in improving the wellbeing of the previously excluded have all served as a motivator to stimulating the adoption and use.

2.6 Regulation and Mobile Money Financial Inclusion

Policy makers around the world have recognized financial inclusion as a central pillar to achieving sustainable inclusive socioeconomic development (Cull, Ehrbeck & Holle, 2014). The World Bank Group has prioritized, among other things, a goal towards a universal access to basic financial services as essential to reducing vulnerabilities associated with poverty and to providing a greater segment of the population with an opportunity to improve their wellbeing (World Bank, 2013). Initiatives to achieve this goal has brought together financial and non-financial institutions, Mobile Network Operators (MNOs), technological companies and other retail businesses. This has precipitated changes in the regulation. The need for regulation in recent times is much

more urgent given the involvement of MNOs in the provision of digital financial services as a way of facilitating financial inclusion. Regulation is therefore critical in the deployment of mobile financial services (MFS), as well as in the supervision and control of the activities of service providers, which may not be financial institutions (Bara, 2013).

Over the years, there is an increasing recognition among both regulators and service providers to curtail risks that hamper financial inclusion. Regulators have recognized the positive impact of digital and mobile financial service in promoting financial inclusion and have come to the conclusion that the appropriate regulatory environment can serve as an enabler to unlocking the growth potential of the service (AFI, 2010). Groppa and Curi (2015) have advanced three reasons to explain the essence of a regulatory framework in managing financial service. The first reason is that the provision of financial service is shrouded with many risks, and regulatory controls can ensure that those risks are well managed. The second reason is the need to ensure that service providers are complying with regulations that protect the financial system from money laundering and terrorism financing. The final reason concerns the need to put controls in place to protect consumers and users from system abuses and fraud.

2.6.1 Regulatory Models and Approaches to Mobile Money Operation

According to Evans and Pirchio (2015), the ability of MoMo to drive financial inclusion depends on many factors, chief among which are the nature of the regulation and the quality of existing infrastructure to enhance the deployment of the service. There are basically two models to regulating MoMo activities: the bank-led or financial

institution-led model; and the MNO-led or telco-led model (Suárez, 2016; Hernandez, Bernstein & Zirkle, 2011).

Research has shown that among the two models, the telco-led model has proven to be relatively more effective in driving mobile financial inclusion than the bank-led model. Where regulators adopt a bank-led model to regulate MoMo, the regulations are usually strict and tight with the overall aim of protecting financial security. Bank -led models have not been able to drive growth in countries where it has been adopted, mainly because banks are slow to innovate and they respond slowly to market demands (Macmillan, Paelo & Paremoer, 2016; Hernandez, Jiménez & Martín, 2011).

On the other hand, evidence has shown that where regulators give the MNOs the license to lead the deployment of MoMo services, there is an increasing adoption of MoMo service (Evans & Pirchio, 2015) and this enhances financial inclusion. The performance emanates from the widespread and easily accessible mobile networks. Thus, wherever there is mobile network coverage, the people can have access to a MoMo service. Unlike bank structures, which are not available in all places, in an economy with well-developed mobile network infrastructure, a large proportion of the geographical space could be covered by mobile networks. Actually, research has shown that in developing countries, governments support telcos to reach out to a large segment of the population by providing the needed infrastructure to make that happen. This, therefore, makes it easy for telcos to deploy MoMo services to even places where it is uneconomical for banks to site their branches (Evans & Pirchio, 2015).

The fast-growing mobile financial inclusion in many East African countries has largely been attributed to the liberal MNO-led regulation that countries like Kenya and Uganda adopted (Macmillan, Paelo & Paremoer, 2016). The regulation went together with

infrastructural development and a general acceptance of MoMo among the population. MNO-led models usually have lower provisions for know your customer (KYC) requirements and even lower requirements for agents (Bourreau & Valletti, 2015).

Despite the performance of the telco-led model in facilitating financial inclusion, there are still issues with barriers to entry. Consumers stand to benefit from quality service and lower service charges from a sector with high competition (Mazer & Rowan, 2016; Banda, Robb, Roberts & Vilakazi, 2015). Unfortunately, it is very costly to enter into the telecommunication space due to the high capital required to provide infrastructure. The high entry cost, therefore, impedes competition and the quality of service that consumers would have enjoyed in the face of competition (Macmillan et al., 2016).

2.6.2 Regulatory Approaches to MoMo Operation

According to the Alliance for Financial Inclusion (AFI) (2010), regulatory models aimed at promoting mobile financial inclusion 'require [that] regulators balance openness to experimentation and innovation with sufficient certainty about the legal framework that protects users and clearly assigns liabilities' (p.8). Openness encourages innovation, which enables MNOs to adopt emerging technological innovations to provide mobile financial services to a large number of people. Certainties within the regulation give service providers the confidence to expend resources to deploy innovative financial services, knowing that their returns are much assured (Porteous, 2006). It is also possible for consumers to find the products and services of mobile service providers unattractive and unreliable. There is, therefore, the need for regulators to put in place safeguards that will protect the interest of consumers, and such guarantees can enhance adoption (Lyman, Pickens & Porteous, 2008). An

enabling regulatory environment is therefore a necessity to provide service providers with absolute certainty and assurance to invest and innovate.

There are basically two approaches to regulating MoMo operations: the test and learn approach and the regulatory-led approach. The test and learn approach is where the regulator gives early implementers the space to experiment with different models and approaches; and based on the learnings that will be gathered over time, the regulator and the service provider(s) together with other stakeholders (like the financial institution) draft regulations to guide the deployment of the service. Within the experimentation stage, the constant dialogue between key actors and stakeholders enhances a comprehensive understanding of the facilitating conditions that can enhance uptake of the service, by addressing the rigidities facing all parties as well as the demands of the market (AFI, 2010).

Experts have therefore argued for a 'test and learn' approach to regulate digital financial service rather than a regulatory-led approach. Their argument is based on the fact that it is practically impossible for any regulator to foresee how a technological service will evolve in any environment. Also, any time regulations are put ahead of innovation, they tend to cripple growth due to the regulatory restrictions. Leading a technological innovation with regulation will always demand changes within the regulation from time to time to cater for unforeseen contingencies (AFI, 2010).

Evidence from Kenya and the Philippines shows that at the early stages of their MoMo operations, they opened up the service for other service providers to invest in the exploration of new products and service (Porteous 2009). Instead of providing a regulatory framework to drive the service, both countries allowed the early service providers to roll-out the service under close and consistent monitoring with periodic

engagements. After the service had evolved for a whilst, the regulator stepped in with measures to give certainty, clarity and security to the service providers (AFI. 2010). Similarly, in Zimbabwe, the Reserve Bank of Zimbabwe (RBZ) adopted a test and learn approach by launching Econet EcoCash, without any regulation. Though the Econet was allowed to experiment with different models, the RBZ regularly engaged and monitored their operations and gathered some knowledge whilst also learning for some time before coming in with regulations (Bara, 2013; AFI, 2010).

Unlike Kenya, Zimbabwe and the Philippines, countries like Sri Lanka and India adopted a regulatory-led approach to commence MoMo operations, but later realized that they could only achieve mobile financial inclusion through an MNO-led approach. Sri Lanka's initial regulation was bank-led. The regulation by Central Bank of Sri Lanka (CBSL) demanded all MoMo customers to open a bank account with the National Development Bank. Over time, the CBSL realized that this bank-led model cannot drive financial inclusion, hence they revised the regulation to give licenses to interested non-bank actors to offer MoMo service. The new regulation reduced the KYC requirements for opening an account. It even allowed for remote registration of customers through the mobile phone, using the details for SIM registration for the KYC requirements. These changes accelerated adoption and growth of the service (AFI, 2010). A similar bank-led approach was adopted by India, and the Central Bank was forced to revise the regulations. Another country which initially adopted a bank-led model is Pakistan. It started with the branchless banking guidelines in 2008, which gave only banks the mandate to deploy the service. The inability of the banks to drive adoption and growth coupled with the pressure from the MNOs to enter the market led to a revision of the guideline in 2011 to allow for non-banks to enter the market (Staschen, 2018).

Uganda commenced MoMo operation in March 2009, which is the same year Ghana launched its MoMo. Like Ghana, it was launched by MTN, and there are currently four MNOs providing the service which includes Airtel, Africell/Orange and Ugandan Telecom. There are some service providers who are providing MoMo in Uganda that are not MNOs, namely EzeeMoney, MCash and Smart Money (Bank of Uganda, 2015). These are similar to the activities of Fintechs in Ghana. Uganda's success story has largely been attributed to its liberal regulatory framework. Their regulatory framework has had minimal limitations on who can become a MoMo service provider. It did not only give service provision authority to the banks, but allowed MNOs and other non-MNOs to acquire the license to provide the service. As expected, the KYC was minimal and the restrictions on who can become an agent was also minimal (Bourreau & Valletti, 2015). This therefore increased the number of agents, thereby bringing financial services closer to the doorsteps of people and even in areas with no financial institutions. The regulation required service providers to enter into partnership with the banks, where the banks were expected to hold the float in trust for the MNOs. The increasing partnerships contributed greatly towards the deployment of mobile banking and mobile payment services (Macmillan et al., 2016).

2.6.3 Role of Regulation in Financial Inclusion

There are only a few studies that have paid attention to the role of regulation in facilitating financial inclusion. Access to and increasing usage of quality and affordable financial services have enormous benefits for the economy (Levine, 2005). The use of financial products and services offered by banks and non-bank financial institutions is, however, largely dependent on the level of trust that customers have in the service providers. People will deposit their monies in a financial institution, take loans and

access other products and service only when they have the assurance and confidence that their savings are safe with the service provider and that the service provider will not act opportunistically. This therefore makes regulations and the supervisory role of Central Banks essential to maintain public confidence in financial service providers (Ofoeda, Gariba, & Amoah, 2016).

Mathenge (2007) grouped regulations into seven: safety and soundness, monetary policy, credit allocation, consumer protection, investor protection, entry and chartering regulation, and price. Falkena, Bamber, Llewellyn and Store (2001) grouped all these regulations into two: prudential regulation and conduct of business regulation. Prudential regulation focusses on the efficiency of financial service providers, whilst the conduct of business regulation deals with how financial service providers will deal with their customers.

Prudential regulation is essential for ensuring that financial institutions (both banking and non-bank financial institutions) invest prudently so that the customer will get value on the funds deposited in the accounts. Prudential regulation, therefore, helps to lessen and even eliminate various forms of inefficiencies within the financial system that may lead to market failure (Ofoeda et al., 2016; Ofoeda et al., 2012). Spong (2000) also added that it is essential for the Central Bank to introduce regulation to protect the funds people have deposited from undue risks. Regulation also helps financial institutions to be efficient, and this helps to create a competitive environment (Viscusi, Vernon & Harrington, 2005). This competitive environment helps the economy to enjoy good and quality products and service which are diverse in nature and at a lower price (Mazer & Rowan, 2016).

In the era of digital financing, one of the major obstacles to financial inclusion is poor regulation. Other factors such as poor infrastructure, lack of or weak institutions, and unstable economic and political conditions. These can equally have a significant impact on financial inclusion. The financial market is currently undergoing great innovative and technological changes with the entrance of many different market players into the digital financial space. These entrants (e.g. MNOs and Fintechs) are coming in with different service delivery channels and different business models. There are also diverse collaborations and cooperation between service providers to launch products and service in order to obtain some economies of scale whilst remaining competitive. Changes in traditional financial regulations are therefore critical to managing the various risks within the digital financial space and, more importantly, give users consumer protection assurance, which is critical to enhance the rate of adoption and use of the service (Center for Global Development, 2016).

According to the Center for Global Development (2016), it is generally hard to predict the future of digital financial inclusion. What stakeholders can be certain of is the continuous evolution of innovation in the financial space with new players entering the market with different market models. It will be very difficult for regulators to be proactive in their regulatory approach because in the era of emerging new players and products, traditional players will also adopt new innovative models to remain in the market. All these evolutions can be well managed with a strong regulatory framework in order not to destabilize the financial system.

2.7 Challenges to MoMo Adoption

MoMo, like any other technology, is not free from challenges. The basic challenge, according to Hoofnagle, Urban and Li (2012), lies in the ability of MoMo operators to convince both the sellers and consumers of the service's relevance. The providers of the service must be able to convince the sellers of the service to build and improve upon their existing infrastructure to the point that consumers of the product can obtain the enabling environment or framework to use the MoMo. Until the seller is convinced that the system as profitable and the consumer is convinced that the system as useful to his/her livelihood, adoption cannot take place.

After adoption, certain challenges have been found to have negative consequences on users and potential users. One such challenge is network failures. Balan, Ramasubbu, Prakobphol, Christin and Hong (2009) found that in places with no or unstable network coverage, adoption is very low because the system requires network coverage to function. Even in urban areas, stormy weather conditions, according to Balan et al. (2009), can disrupt the network system, leading to delays in transactions. Bampoe (2015) also found network failures to be the main challenge facing MoMo users and potential users in Ghana. The delays in a MoMo payment system, especially during network failures, can 'be disastrous, especially in case of emergency that would require money urgently' (Otieno & Liyala, 2018, p.20).

In Kenya, Otieno and Liyala (2018) found that many of the traders still continue to use cash for their transaction instead of relying on the MoMo payment because they do not trust the system. Trust continues to remain a major antecedent to MoMo adoption. They also found that some have not adopted the system because they do not have the prerequisite requirement (ID card) to enable them to register for the service. In some places, there are few or no agents, especially in rural areas. Where there are agents,

these agents usually do not have adequate cash or float to serve the customers, mainly because of security reasons. Because of the high illiteracy rates in many developing countries and communities, most people do not have the requisite skills and even information to access and use the services available on the platforms. Some even do not know of the existence of such services or do not have adequate information to process the information and make the decision to use the service. Some people are also limited in their use of the service mainly because of language barriers (Otieno & Liyala, 2018). An economic survey conducted by the Government of Kenya found that the challenges confronting the adoption of MoMo and other technologically driven financial service include inadequate or lack of I.T. skills and infrastructure, as well as limited information. There is also limited or poor mechanisms for disseminating information, even where the information is available (Government of Kenya, 2003).

2.8 Factors Accounting for Financial Exclusion

Over the past years, scholars have become more interested in investigating the factors driving the low financial inclusion in developing countries (Johnson & Nino-Zarazua, 2011). This is mainly because the limited access of a majority of the population to basic financial services impedes their ability to save and to undertake basic investment that can smoothen their consumption and elevate them out of intergenerational poverty (Dupas & Robinson, 2013b; Demirguc et al., 2012). Financial exclusion also reinforces other forms of social exclusion, thereby making it difficult for the majority of people to overcome the barriers of poverty. High financial exclusion has been attributed to the concentration of formal financial institutions such as banks in urban areas, thereby increasing the monetary and opportunity cost of the rural poor to access formal financial

services (Munyegera & Matsumoto, 2016; Beck & Cull, 2015; Mlachila, Dykes, Zajc et al., 2013).

According to Aduda and Kalunda (2012), the roots of financial exclusion are embedded in social exclusion. Social exclusion, according to the authors, is a product of social disadvantage. Social exclusion is 'the processes in which individuals and entire communities of people are systematically blocked from rights, opportunities and resources that are normally available to members of society and which are key to social integration' (Aduda & Kalunda, 2012, pp. 101). According to the Department for International Development (DFID), social exclusion results from discrimination against a certain class of people in society based on certain demographic characteristics, some of which are gender and locality of residence (DFID, 2005). Some people are therefore financially excluded because of the lack of financial opportunities in their localities of residence, or even by the social norms that constrain certain classes of people (e.g. women). Social exclusion is therefore dynamic, relative and multidimensional in nature. It has economic, social, cultural and political dimensions that differ across different segments of society, and the impact on the lives of people also differs over time (DFID, 2005).

Kempson and Whyley (1999) outlined six different forms of financial exclusion: physical access, access, condition, price, marketing, and self. Access exclusion deals with restrictions based on risk assessment processes. Conditional exclusion is where the types of financial products and services do not serve the needs of some segment of people in society, and hence forces them to remain excluded. Some people are also excluded because the prices of financial products are not affordable to them. Marketing of financial products can also target certain groups that are profitable to financial institution, at the expense of the poor. Some people may decide to be financially

excluded because they feel they would be refused access to those financial products (self-exclusion). People sometimes remain excluded because they may have been denied access to certain financial products in the past.

Other studies have found that some of the reasons why people are excluded is their lack or access to information about financial institutions as well as the products and services. Others are also excluded from accessing certain financial services because of lack of documentation, high service charges and interest rates (Dupas & Robinson, 2013a: Ellis, Lemma & Rud., 2010; Kempson & Whyley, 1999). The locality of residence (especially living in rural areas) as well as high level of illiteracy can render someone financially excluded (Dupas & Robinson, 2013a; Ellis et. al., 2010).

After reviewing many empirical studies, Dube and Gumbo (2017) found some factors that prevent people from becoming financially included. Prominent among these are low income, lack of identity, low financial literacy, lack of trust and non-suitability of financial products and services to the poor. For instance, some people are financially excluded because they lack legal identity such as a national identity card or any legally accepted certificate required to open an account. There are also certain psychological and cultural factors, which either force certain classes of people out of the financial system or make them feel they are excluded from the system. Such cultural factors include the patriarchal nature of many communities in developing countries. Certain structural requirements and formalities, such as the minimum balance required by banks to maintain an account, are usually expensive for those who are already excluded because of financial rigidities. People who are financially excluded often have low levels of education (Dube & Gumbo, 2017).

According to Goland, Bays and Chaia (2010), poor people are usually financially excluded because it is costly for financial institutions to reach them, especially those living in rural areas, and they are considered 'unsustainable business' because returns from any investment to reach them will be small. The products and services of many financial institutions are also not tailored to meet the needs of these economically disadvantaged groups, and regulations often do not pay particular attention to these groups of people. Initiatives aimed at bringing the poor into the inclusion gap should comprise strong private sector participation of both financial and non-financial institutions, financial literacy campaigns, microfinance development and strong support from the public sector (Chibba, 2009). Whilst these factors may not be readily available, in recent times, both key financial and non-financial institutions are gradually gaining understanding of the needs of poor people and devising ways of meeting them. Technological advancement has provided relatively cheap and reliable ways of reaching the poor. Finally, governments are expending resources to provide the regulatory and enabling environment critical for serving the financially excluded segment of the population (Goland et al., 2010).

2.9 Gaps in Literature

There is an emerging body of literature on MoMo adoption, especially from East African countries and from some West African countries like Ghana and Nigeria. Most of the studies on the drivers of MoMo have approached the analysis without taking cognizance of the inter- and intra-sociodemographic differences that exist between and within countries. The results usually indicate that the sociodemographic characteristics between and within countries are uniform. However, differences exist. This means that the drivers of adoption are more likely to differ when these differences are taken into consideration and such results are imperative to designing targeted policies and actions

to bridge the financial inclusion gap, paying specific attention to the drivers among those within rural areas, the poorest 40% income tercile, and those with no or less formal education, as well as women.

Also, it is not enough to conclude that MoMo is bridging financial inclusion without an empirical analysis on the extent to which MoMo is graduating people to use the full range of formal financial services such as: current account, saving, credit and insurance. A few of the emerging studies (such as Ouma et al., 2017, Jack & Suri, 2011) have tried to study how MoMo is facilitating savings. In Ghana, only a handful of studies exist (such as Apiors & Suzuki, 2018; Osei-Assibey, 2015; Aker & Wilson, 2013; Dzokoto & Appiah, 2014), and the focus of these studies was on saving and not the other forms of formal financial services. Also, even though there is an increasing recognition of the role of Central Bank regulation in facilitating financial inclusion in Ghana, most recent studies have paid little or no attention to this. In the Ghanaian context, there are only a couple of newspaper and online news publications that have made efforts to recognize the role of regulation in driving mobile financial inclusion.

This study, therefore, seeks to fill these gaps to add to the scanty studies in Ghana focussing on: (1) assessing how the drivers of mobile money adoption vary across the sociodemographic characteristics of the Ghanaian population; (2) how mobile money serves as a gateway to the use of formal financial services; and (3) how Central Bank regulation is facilitating mobile financial inclusion in Ghana.

2.10 Conceptual Framework

Based on the theoretical and empirical review, this study conceptualizes mobile money adoption to be influenced by factors such as perceived usefulness, ease of use, cost of

transaction, quickness of transaction, convenience, proximity and social influence. As predicted by the Technology Acceptance Model, ease of use has a direct influence on perceived usefulness. Also, perceived usefulness, ease of use, quick transaction, convenience, proximity and social influence are all expected to have a positive influence on MoMo adoption. However, cost of transaction is expected to have a negative effect on MoMo adoption. Thus, if people consider the cost of transaction to be high, it will negatively impact on adoption.

The study further conceptualizes the probability of adoption to be mediated by Ghana's demographic characteristics. Demographic characteristics considered in this study are gender, age, education, region of residence, locality of residence and income level. There is more likelihood for gender to have no statistically significant moderating impact on adoption. Age is expected to have a significantly concave relationship on MoMo adoption. Education is expected to emerge as a significant variable moderating adoption the factors and adoption, with the probability of adoption increasing with increasing levels of education. Regional disparities are expected in the rate of adoption, and locality of residence is expected to emerge as very significant. Rate of adoption in urban areas is expected to be significantly higher than in rural areas. Higher rates of adoption are also expected to be seen among those within the rich 40% income tercile as compared to the poor 40% tercile.

Adoption of MoMo is considered as representing 'financial inclusion', just as ownership of a bank account. Thus, ownership of a MoMo account should enable the person to perform the basic financial service of sending and receiving payments. The next level, which this study also seeks to assess, is the extent to which having a MoMo account serves as a gateway to access other forms of formal financial services. The formal financial services considered in this study are ownership of a formal account,

use of formal savings, and credit. Due to data limitations, use of insurance products is not considered in this study. MoMo is expected to serve as a gateway to the use of these formal financial service.

The study further sees the rate of MoMo adoption as well as the effect of MoMo on the use of formal financial services to be mediated by Central Bank regulation. A Central bank regulatory model and approach affect the extent to which service providers can collaborate with other formal financial service providers to provide formal financial services to MoMo users. For example, the nature of regulation will determine whether MNOs can enter into partnership with lending or insurance institutions to provide credit or insurance services on MoMo platforms.

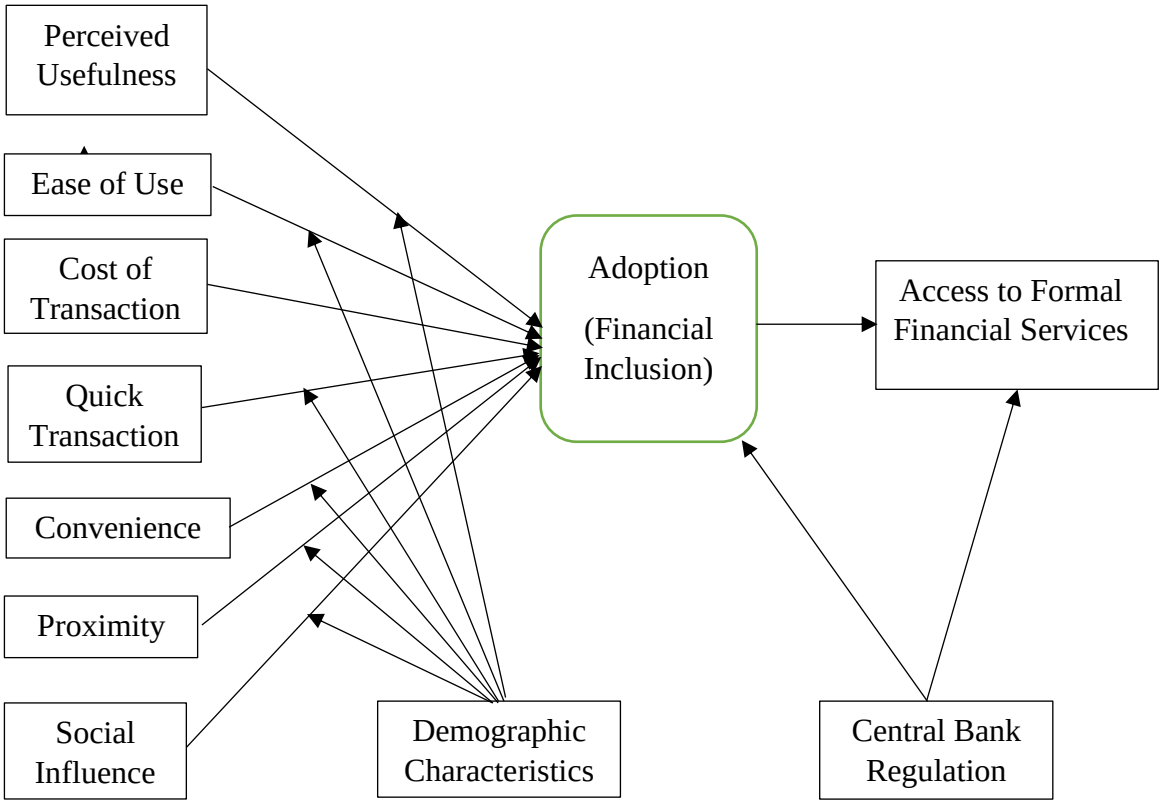

Figure 2. 1: Conceptual Framework on MoMo Adoption

Source: Author's own construct, 2019

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents detailed information on the various methods and approaches that were employed in collecting and analysing the data. It begins with the philosophical underpinnings and the research design. It also presents the sources of data that were used to address the research questions. It also provides information on how the respondents were sampled, the sample size and the empirical estimation models for the first and second objectives. The ethical issues that were considered are also presented in this chapter.

3.2 Research Philosophy and Study Design

Research philosophy is basically defined as the nature of knowledge and how researchers construct that knowledge. The pragmatism philosophy was adopted in this study. Pragmatism has been cited by many scholars as the best philosophy in answering research questions whose epistemology, ontology and axiology are both positivist and interpretivist. It is therefore the appropriate philosophy to guide studies that adopt mixed methods in answering the research questions (Saunders, Lewis & Thornhill, 2009; Tashakkori & Teddlie, 2003).

According to Saunders et al. (2009), the pragmatist epistemology and axiology incorporate both the observed facts about a phenomenon as well as the subjective meanings people provide about the phenomenon in the construction of knowledge. It therefore embraces peoples' values and subjective meanings as a source of knowledge, usually in helping to get an in-depth understanding of the observed facts.

The study adopted a sequential explanatory mixed method approach in gathering and analysing the data to answer the research questions. Generally, the idea of using a mixed method is based on the fact that each of the research approaches (qualitative or quantitative) will not be sufficient in capturing trends and explaining the nuances in the study. However, when they are combined, they complement each other to enhance the analysis (Newby, 2014; Flick, 2011; Tashakkori & Teddlie, 2003) and increase the validity of the results emerging from the data (Orgard, 2005; Bazeley, 2002), leading to the discovery of new facts and knowledge about social phenomena (Stange, 2006).

Research has shown that there are over forty mixed methods in literature (Tashakkori & Teddlie, 2003), and one of such designs is the sequential explanatory mixed method. Sequential explanatory mixed method is a type of mixed method where the researcher first adopts a quantitative approach to gather data; then, based on the analysis of the data, a qualitative data collection approach is used to gather additional in-depth data to enhance the understanding and discussion of the facts observed from the quantitative results (Creswell, 2004; Tashakkori & Teddlie, 2003). This design is highly useful when unexpected results are likely to arise from the quantitative analysis (Morse & Niehaus, 2016).

A quantitative analysis was conducted to answer the first two research questions, whilst a qualitative approach was used to collect and analyse data for the third objective. The qualitative chapter helps to properly understand one of the major factors that accounted for the performance of MoMo deployment and adoption in Ghana.

3.3 Sources of Data

Three different datasets were used in this study. Nationally representative primary data were collected for objective one. This data were collected in 2016 alongside a survey ISSER was conducting at the time, and the purpose was to get a nationally representative sample to estimate the drivers of MoMo adoption for the entire country.

The second source of data, which was used to answer the second research question, was taken from the World Bank Global Financial inclusion survey datasets. Since 2011, the World Bank has been conducting a financial inclusion survey, popularly known as the Global Findex Survey, across many countries, including Ghana. So far, there exist three rounds of the Findex survey: 2011, 2014 and 2017. In 2011, the proportion of people using MoMo was insignificant, therefore it was not useful in running any inferential analysis. The survey did not pay much attention to MoMo at that time. This study, therefore, made use of the 2014 and 2017 datasets. These datasets were appropriate in assessing the performance of Ghana under the 2008 branchless banking guideline and the performance of Ghana under the 2015 electronic money issuers (EMI) guidelines. Thus, the period before and after the regulatory change. This data were used to assess the extent to which MoMo serves as a gateway for users to access formal financial service.

The final data were collected through an in-depth interview of key stakeholders on the role of regulation in facilitating financial inclusion in Ghana. Research has shown that the qualitative method of data collection is essential in social sciences as it offers researchers the opportunity to find out about the perceptions, feelings and experiences of people, as well as their subjective assessment of the nature of social reality (King & Horrocks, 2010; Seale, 2004). Basically, the purpose is to provide a detailed description and explanation of social events and the social context and the people's understandings

of these events (Willig, 2008). The in-depth interviews with key stakeholders who are involved in deploying the MoMo service – namely the regulators, the service providers and the industry associations – were to seek their assessment on how regulation has impacted the performance of MoMo in the Ghanaian financial market.

3.4 Sampling Method and Sample Size

This section presents the various methods that were adopted to select the respondents for the study.

3.4.1 Sampling Method for Field Survey

This survey was conducted across all the ten regions in Ghana. It was conducted at the household level. To get a representative sample of households, a multi-stage sampling approach was used in selecting the random sample for the study. The first stage involved the random selection of 200 nationally representative enumeration areas (EAs) from the national list supplied by the Ghana Statistical Service (GSS). This was distributed across the regions of Ghana using the probability proportional to population size and in relation to the distribution of mobile phone usage in Ghana. The distribution of mobile phone usage data was obtained from the 2010 Census report of Ghana. Table 3.1 shows the distribution of the sample across the regions of Ghana. This was obtained from 200 enumeration areas.

Table 3. 1: Ex Ante Distribution of Sample Across Regions of Ghana

Region	No. of EAs	No. of Households	% of Sample
Western	19	503	9.6
Central	18	468	9
Greater Accra	26	681	13
Volta	18	468	9
Eastern	21	550	10.5
Ashanti	30	783	15
Brong Ahafo	19	494	9.5
Northern	20	520	10
Upper East	15	389	7.5
Upper West	14	364	7
TOTAL	200	5,220	100

The second stage of the sampling involved the selection of 26 households in each EA. This meant that the targeted total number of individuals across the country for the survey was 5,200. However, during the field work, the enumerators oversampled by 21 across four regions: Western, Greater Accra, Eastern and Ashant regions. The sample for Upper East region reduced by one. This brought the final sample to 5,220 (see Table 3.1)

The selection of households in the EAs followed a random route. Using the EA maps, the field teams first identified the EA base and a central point in the EA. At the central point, the EA was then divided into four quadrants, for which each enumerator was assigned a quadrant. The random route approach was carried out such that on Day 1 of the survey, the teams started with a systematic count of 4, so that each enumerator visited every 4^{th} house. On Day 2, every 5^{th} house; on Day 3 every 6^{th} house; and on

Day 4 every 7th house. One Day 5, the pattern was again repeated such that every 4th house was visited and so on. At each house, the enumerator determined if the household was eligible. The eligibility criterion for selecting households to be interviewed was that at least one member of the household owned a phone (mobile or fixed line). If a household was not eligible, the enumerator moved to the next household.

At a third stage, an individual in the household was selected for interview. The Kish Grid was used to select the eligible household member to be interviewed. This process involved first, listing all eligible household members – including those aged at least 13 years. Then, the eligible members were ranked based on their age (oldest to youngest) after which the eligible member was selected from the grid.

3.4.2 Sampling Design of the Findex Datasets

The Findex is conducted by Gallup Inc., and it randomly selects 1,000 people from each country as a representative sample. The method of selecting respondents in the Findex survey is similar to the sampling design described above. The target population is the adult population who are 15 years and above. The Findex uses a two-stage sampling procedure in selecting respondents. The first stage involves the clustering of households as the primary sampling unit. These households are further stratified using population size, geography or both.

In countries where there are data availability, probabilities proportional to population size approach are used to determine the number to select from each geographical area or region, but where there is data limitation, respondents are selected randomly across the country. The researchers used a random route approach. Interviewers usually visited the sampled household twice if family members were absent in the first visit. Where a

household was not available, it was substituted with the next household. The Kish grid method was used to select respondents in a household.

3.4.3 Sampling Design for Institutional Interview

The focus of the last objective was on the role of Central Bank regulation in facilitating financial inclusion in Ghana. The objective required people who have an in-depth knowledge and understanding of the Central Bank regulations. The researcher therefore purposively selected key stakeholders who were involved in the drafting of the regulation or are beneficiaries of the regulation. These comprised the regulator and other regulating institutions, the service providers and the industry association. Therefore, the Bank of Ghana, the National Communication Authority (NCA), the Ghana Interbank Payment and Settlement System (GhIPSS), the Ghana Chamber of Telecommunications (GCT), MTN and AirtelTigo were purposively selected.

Bank of Ghana is the regulator of MoMo operations in Ghana. GhIPSS is a subsidiary of the Bank of Ghana with the mandate to implement and manage interoperable payment system infrastructures for banks and non-bank financial institutions in Ghana. NCA is the regulator of telecommunication companies in Ghana and thus regulates the platform on which the MoMo service is provided. The Ghana Chamber of Telecommunications was created and inaugurated in 2011 as a telecommunication industry association. It is a private initiative founded and funded by the mobile operators with the active drive to support the industry's growth on issues relating to policy, regulation, and legislative-related matters with the long term intention of sustaining the mobile telecommunication industry in Ghana. MTN and AirtelTigo are

MoMo service providers. One other MoMo service provider in Ghana is Vodafone. They declined to participate in this study.

These institutions were selected purposively because they are the players in the MoMo ecosystem in Ghana. The interviews centred on the reasons Ghana adopted a regulatory-led approach to MoMo, the factors that precipitated the various regulatory changes, how regulation has shaped Ghana's mobile financial inclusion performance, the challenges with the current regulation, and the regulatory changes that can enhance greater financial inclusion.

3.5 Data Collection

For the field survey, the Computer-Assisted Personal Interviewing (CAPI) System was used to capture data from the field. Since data were collected using netbooks/tablets, enumerators were trained over a 7-9-day period to ensure full understanding of survey material and allowing for final edits to take effect. The importance of adequate training before the survey cannot be overemphasized, and indeed is not diminished with the use of CAPI. The training remains critical, as it is the only means for ensuring that all survey team members correctly and uniformly follow survey procedures. The survey was conducted face to face. The survey management team maintained high data quality throughout the process. The survey questionnaire is presented in Appendix 4.

Similarly, the Findex survey data collection was done face to face. However, where it was difficult to get a face to face interview after three visits to the household, a telephone interview method was adopted to collect the data. In some countries, a telephone interviewing approach has been adopted drawing respondents from a nationally representative phone directory.

For the institutional interviews, a letter was sent to the management of each organization to give clearance and to appoint the appropriate executive to engage the researcher in an interview. The interview with the Bank of Ghana was conducted on 28th May, 2018 with three managers from the Bank of Ghana Payment Systems Department. The interview with the NCA was conducted on 8th June, 2018, and was granted by the Director for Consumer and Corporate Affairs Division. The interview with GhIPSS was conducted on 28th June, 2018, and was granted by the Head of Project and Communications on behalf of the Institutions. The interview with AirtelTigo was conducted on 3rd July, 2018, and was granted by the Head of Corporate Affairs. Also, the interview with Ghana Chamber of Telecommunications (GCT) was conducted on 8th August, 2018, and was granted by the Head of Research and Communications. Finally, the interview with MTN was conducted on 11th October, 2018, and was granted by the Manager of MFS, analytics, budget and reporting. See Appendix 5 for interview guide.

Apart from Bank of Ghana, which did not allow the researcher to record the interviews, all the other institutions allowed the researcher to record the interviews with their permission. After the interviews were recorded, they were transcribed and sent back to the organization for validation to reflect the position of the organization. In the case of Bank of Ghana, the researcher picked as much information as he could during the interview. The information gathered was validated by the Central Bank Payment Systems department. They also wrote down some of the information the researcher needed to complement the information gathered during the interview.

3.6 Data Analysis

This section begins with how financial inclusion is measured, followed by a description of the empirical estimation models used for analysing objective one and two. The section also contains information on how the qualitative data were analysed.

3.6.1 Measuring Financial Inclusion

In literature, there are four classical indicators for measuring financial inclusion. These are access, quality, usage and impact (Serrao, Sequeira & Hans, 2012; Hannig & Jansen, 2010). Access refers to the ability of people to use the financial products and services, mostly from formal financial institutions, available to them. Quality measures how well the financial products and services meet the lifestyle needs of the user or consumer. Usage measures the depth of usage of financial products and services. Thus, after adopting a financial product or service (access), usage measures permanence and the extent to which the consumer uses those financial services and products. Impact measures the changes that occurs to a user of a financial service and product that can be attributed to the access, quality and usage of the financial product and service (Serrao et al., 2012; Hannig & Jansen, 2010).

Due to limited data, this study used only the access component to measure financial inclusion. The commonest indicator for measuring access is the ownership of account (Chattopadhyay, 2011). Since the emergence of MoMo, ownership of a MoMo account has been added to the measures of financial inclusion to measure the access component of financial inclusion (Demirguc-Kunt et al., 2018). Sahrawat (2010) has, however, argued that using the ownership of an account as a measure of financial inclusion may sometimes be misleading. Sahrawat (2010), therefore, recommends that scholars should emphasise the intensity of using financial services and products rather than just mere ownership of the account, since ownership does not automatically mean usage. Even

though Sahrawat (2010) presents a valid argument, due to data limitation the ownership of account is still the most common measure of financial inclusion, as used by Demirguc-Kunt et al. (2018). Ownership of account was therefore used as a proxy for financial inclusion in this study.

3.6.2 Quantitative Data Analysis

The data for objectives one and two were quantitative in nature and, hence, both descriptive and inferential analytical methods were used in the analysis of the data. Tables, frequencies and percentages as well as graphs were used to descriptively present the results. Cross tabulation analysis was conducted to observe the relationships between the demographic characteristics of the respondents and the use of the MoMo service. A similar analysis was conducted to descriptively assess the characteristics of those who are financially included and those who are financially excluded. To establish that the observed differences did not happen by chance, a chi-square test was conducted to test the significance of the difference. The descriptive analysis was weighted for the Findex data to account for the stratified nature of the survey sampling design. The field survey was self-weighted using the probability proportional to size in relation to the distribution of mobile phone usage in Ghana, as presented in Table 3.1.

For objective one, which sought to assess the drivers of MoMo adoption and how it varied across the characteristics of the respondent, a probit regression was used. A recursive bivariate probit analysis was conducted to analyse the Findex data to estimate the extent to which MoMo serves as a gateway to the use of formal financial service. The choice of the probit model over, for instance, ordinary least squares (OLS) is based on the binary nature of the dependent variable. The choice of probit over logit is also

based on the assumption that the errors have a standard normal distribution (Adekanmbi, 2017). The empirical estimation models are presented below:

Probit Regression Model for Assessing the Drivers of MoMo Adoption

Adoption of MoMo is simply defined as ownership of a registered MoMo account. A latent variable probit regression was conducted to estimate the significant predictors. The explanatory variables that were used for estimating the probability of adoption were the characteristics of the respondents (age, gender, education, locality of residence, and region of residence) and the theory variables (perceived usefulness, easy to use, cost of transaction, easy transaction, convenience, availability and social influence).

The decision of an individual (i) to adopt MoMo is defined as:

$$y_i = x_i' \beta_i + \varepsilon_i \quad \text{...} (1)$$

where x_i is a vector of the explanatory variables; β_i is a vector of estimated parameters including a constant term and ε_i is a random error term with a mean of zero and assumes the standard normal distribution.

However, the decision of an individual to adopt MoMo is unobserved. What is observed is an event that defines whether the person has a registered MoMo account or not, which is defined as:

$y_i^* = 1$ if $y_i > 0$ (the individual is a registered MoMo user)

$y_i^* = 0$ if $y \leq 0$ (the individual is not a registered MoMo user)

The probability that an individual is a registered MoMo user given the set of explanatory variables is obtained as:

$$\Pr(y_i^* = 1 | x_i) = \Pr(y > 0) = \Phi(x_i' \beta_i) \text{ .... (2)}$$

where Φ is the cumulative distribution function of the standard normal distribution.

To assess the partial effects of the explanatory variables on the individual being a registered MoMo user, the marginal effects are estimated as:

$$\frac{\partial E(y_i = 1 | x)}{\partial x_i} = \Phi(x_i' \beta_i) \beta_i \text{ .... (3)}$$

Table 3. 2: A Prior Expectations for Objective One

Variable	Operationalization	Expected sign	Reference
Gender	Male = 1, Female = 0	+	Jambulingam, 2013; Amin, Hamid, Tanakinjal & Lada, 2006
Age	Grouped as youth, adult and aged (Reference)	Youth +, adult +	Lee et al., 2011; Demirci & Ersoy, 2008; Porter & Donthu, 2006
Education	No Education (reference), basic, secondary and Tertiary	+	Riddell & Song, 2017; Porter & Donthu, 2006; Weijters et al., 2007
Locality	Urban = 1, Rural = 0	+	McKay & Kaffenberger, 2013; Balan et al., 2009
Region	Reference category: Greater Accra	+/-	Balan et al., 2009

Perceived Usefulness	Binary	+	Hussein, 2017; Altawallbeh et al., 2015; Venkatesh et al., 2003; Davis, 1989
Ease of Use	Binary	+	Hussein, 2017; Altawallbeh et al., 2015; Sujeet & Jyoti, 2013; Ahmed et al., 2011
Cost of Transaction	Binary	-	Fungácová & Weill, 2015; Tobbin, 2012; Allen et al., 2012
Quick Transaction	Binary	+	Deans & Gray, 2010
Convenience	Binary	+	Khraim et al., 2011
Availability/ Proximity	Binary	+/-	Tanakinjal, Deans & Gray, 2010; Brown et al., 2002
Social Influence	Binary	+	Oliveira et al., 2016; Echchabi & Olaniyi, 2012

Empirical estimation model for assessing the extent to which MoMo is expanding the use of formal financial services

The second hypothesis of this study states that the adoption of MoMo should serve as a gateway for users to access other forms of formal financial services such as formal

accounts, savings and credit. A probit model is specified in which the probability of ownership of a MoMo account and use of other forms of formal financial services is defined as a function of individual characteristics. The decision by an individual with a MoMo account to access other formal financial services is unobserved. As such, a latent variable probit model is estimated such that the ownership of a MoMo account and access to other formal financial services (y_i^*) depend on the current ownership of a MoMo account (M_i). The effect of ownership of a MoMo account on the use of formal financial services is estimated by the equation

$$y_i^* = \beta' X_i + \delta M_i + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where (y_i^*) is use of other formal financial service, X_i is the personal characteristics and M_i is the ownership of a MoMo account, and ε_i is the random error term. Ownership of a MoMo account is included as a dummy variable in the probit equation. The use of other formal financial services is given by the relationship:

$$y_i^* = 1 \text{ if } y_i > 0$$

$$y_i^* = 0 \text{ if } y_i \leq 0$$

The probability that an individual will access other formal financial services given the covariates of personal characteristics and ownership of a MoMo account is obtained as

$$\Pr(y_i^* \mid X_i; M_i) = \Pr(y_i > 0) = \Pr(\beta' X_i + \delta M_i + \varepsilon_i) = \Phi(\beta' X_i + \delta M_i) \ldots\ldots\ldots (2)$$

where Φ is the cumulative distribution function of the standard normal distribution.

However, there exists the potential of endogeneity between use of MoMo and the decision to access other forms of formal financial services through MoMo. For example, endogeneity may arise when omitted variables (such as technology adaptability and location) are correlated with both decisions – a case of unobserved heterogeneity; or reverse causality between the decisions. In the presence of endogeneity, probit estimation of the effect of ownership of a MoMo account on the use of formal financial services will be inefficient and inconsistent. In addition, since the study estimates the effect of a binary treatment (ownership of a MoMo account) on a binary outcome (access to other formal financial services), the appropriate estimation strategy must account for this distribution characteristics.

This study adopts a recursive bivariate probit model to estimate the effect of MoMo ownership on the use of formal financial services. The recursive bivariate model is a two-equation binary outcome model with correlated error disturbances. The ownership a MoMo account M_i and access to formal financial service y_i are described by the latent variable models:

$$M_i = \mu' X_i + \nu_i$$

$$y_i^* = \beta' X_i + \delta M_i + \varepsilon_i$$

Where M_i is defined as the unobservable probability of an individual to own of MoMo account and y_i is the unobserved net utility that an individual derives from accessing other financial services. The events are observed if the expected net utility or probability are positive. M_i^* and y_i^* are related to the binary dependent variables M_i and y_i by the following rule

$M_i = 1$ if $M_i^* \geq 0$ and 0 otherwise

$y_i = 1$ if $y_i^* \geq 0$ and 0 otherwise

X_i is a vector of the exogenous observed characteristics affecting ownership of a MoMo account and access formal financial service, respectively. Unlike other instrumental variable techniques, the recursive bivariate probit model is identified even if X_i includes the same varying exogenous regressors (Wilde, 2000). The error terms (ν_i and ε_i) are assumed to be distributed bivariate normal with a mean of zero and a constant variance, and $corr(\nu_i, \varepsilon_i) = \rho$. The error terms capture all the other factors that affect ownership of MoMo and access to formal financial services in Ghana. The estimates of the probit model are consistent when p = 0 or statistically insignificant.

Table 3. 3: A Prior Expectation for Objective Two

Variable	Operationalization	Expected sign	Reference
Gender	Female = 1, Male = 0	+	Jambulingam, 2013; Amin et al., 2006
Age	Continuous	+	Lee et al., 2011; Demirci & Ersoy, 2008; Porter & Donthu, 2006
Education	No or less Education (reference), secondary and Tertiary	+	Riddell & Song, 2017; Porter & Donthu, 2006; Weijters et al., 2007
Income	Income Tercile: Bottom 40% (reference), Middle 20% and Top 40%	+	Mukhongo, 2014; Demombynes & Thegeya, 2012; Honohan & King, 2012; Mukindia; 2012; Njunge, 2013

3.6.3 Qualitative Data Analysis

Content analysis method was used to analyse the institutional interviews that were conducted (Mayring, 2014). Using this method, the researcher generated themes and codes from the interviews, and these themes and codes were linked to address the objective of the study. Direct quotations from the interviews were used to support the themes and codes that were generated. Literature on regulation and financial inclusion were used to discuss interview results.

3.7 Ethical Consideration

Throughout the study, the researcher ensured that the study was conducted within the standard ethical framework for conducting social science research. From the design of the study, through the gathering of secondary data to the field data collection, ethical standards were considered. Even in the processing, storage and presentation of the results, the researcher ensured that all the key ethical issues were considered, as recommended by Saunders et al. (2009).

For the primary data collection, ethical clearances were obtained from the Ethics Committee at the College of Humanities to conduct the field survey and institutional interviews. In each of the institutions that were interviewed, permissions were sought from the management through a written letter. After perusing the interview guide, the institution appointed the right office to grant the interview. This, therefore, means that the researcher did not coerce any institution, office or respondent to answer the questions. It is based on this voluntary participation that Vodafone declined to participate in the study, and they were not coerced into doing so.

During the interview, the permissions of the respondents were sought to record the interview. As noted earlier, only Bank of Ghana did not allow the interview to be

recorded, as it was against their organizational practice. All the other institutions permitted the researcher to record the interview. After the transcriptions of the interview, these were sent to the respondents for validation.

Even though management appointed an officer to answer the questions, the respondents were at liberty to decline to answer any question they did not feel like answering. None of the respondents, however, declined to answer any of the questions. Anonymity of the respondents was ensured by concealing the personal identities of the respondents in the analysis, but rather by using their institutional names. Finally, all the secondary sources of information were duly referenced to avoid plagiarism.

3.8 Data Limitations

Social science research is usually conducted within a set of limitations. The major limitation to this study is the variables within the Findex data that was used. There are some variables that are necessary to enhance the robustness of the analysis, but these variables were not in the Findex data, such as locality of residence (urban or rural), household size, frequency of using a financial service (or MoMo), value of savings in MoMo wallet, need of credit facilities, amount of credit obtained, and even when someone adopted MoMo. All these potentially important variables were not collected in the Findex survey.

Another limitation to the study is the decline of Vodafone to participate in the study. Even though their participation would have given a more complete picture from the service providers, their exclusion does not in any way undermine the quality of responses from the two other service providers.

CHAPTER FOUR

DRIVERS OF MOBILE MONEY ADOPTION IN GHANA

4.1 Introduction

The introduction of mobile money (MoMo) service into the Ghanaian economy has shown prospects of offering people the convenience of making financial transactions on their mobile phones. Since 2009 the adoption of MoMo has been increasing steadily. Despite the growth, some still consider the pace of MoMo adoption in Ghana to be slow, given the number of subscribers and active users (Etim, 2014).

The adoption of MoMo is a function of many factors, chief among which is the increased use of the mobile phone device. That aside, the decision of an individual to adopt MoMo is influenced by several sociodemographic as well as technology-based factors. Literature has shown that factors such as perceived usefulness, ease of use, trust, cost and social influence significantly influence MoMo adoption (Hussein, 2017; Altawallbeh et al., 2015; Sujeet & Jyoti, 2013; Ahmed et al., 2011; Park, 2009; Schepers & Wetzels, 2007; King & He, 2006; Davis et al., 1989). Empirical studies across and within countries have shown that there are inter-country and intra-country differences in the factors that influence MoMo adoption (Hussein, 2017; Park, 2009).

This chapter presents an intra-country analysis of the factors that drive MoMo adoption across the characteristics of Ghanaians. The chapter contains analyses on the characteristics of the respondents, the drivers of adoption and how those drivers vary across gender, age, education and locality of residence of the respondent. The reasons for adopting MoMo as well as the challenges in using MoMo service are also presented in this chapter. Finally, the reasons why some people have not adopted MoMo are also

captured in this chapter. Based on these results, conclusions are drawn and recommendations are made.

4.2 Characteristics of Respondents

The total number of respondents in the survey was 5,220, spread across all the ten regions in Ghana (Table 4.1). The majority of the respondents (55%) were females, and the males were approximately 45%. Based on the age of the respondents, they were disaggregated into three age categories: youth, adult and aged. The results showed that a large proportion of the respondents fall within the youthful age category (48.5%), followed by those within the adult age category (40.9%), whilst only 10.6% were above 60 years of age. The age structure of the sample reflects the structure of the entire Ghanaian population, which has been described as youthful, mainly due to the high fertility rate vis-à-vis reducing mortality rates (Ghana Statistical Service, 2012).

In terms of the level of educational attainment, a large proportion of the sample had basic education (35.5%). Those with secondary education were 28.2%, and those with tertiary education were 12.9%, whilst a fifth of the sample (23.4%) had no formal education. Put together, the results show that the majority of respondents have either no formal education or at most, basic education (58.9%). This result is consistent with the national picture. The results from the GLSS 6 show that the majority of Ghanaians (64.3%) have either no formal education or at most, basic education (Ghana Statistical Service, 2014).

The proportion of the sample residing in urban areas (58.7%) vis-à-vis their rural counterparts (41.3%) shows that Ghana is gradually becoming more urbanized. The rapid urban growth in Ghana started in the middle of the twentieth century and it has

been attributed mainly to two major forces reinforcing each other: increasing fertility rates and rural-urban migration (Yankson & Bertrand, 2012).

The regional distribution of the respondents also reflects the population structure across the regions of Ghana. The Greater Accra region, which has the highest population of Ghana's ten regions, had the highest proportion of the respondents, whilst the Upper East and Upper West regions, whose regional populations are relatively low, had the lowest proportion of the sample.

Table 4. 1: Characteristics of Respondents

	Freq.	**Percent**
Gender		
Male	2,338	44.8
Female	2,882	55.2
Age Category		
Youth (13-35 years)	2,531	48.5
Adults (36-60 years)	2,136	40.9
Aged (Above 60 years)	553	10.6
Educational Status		
No Formal Education	1,221	23.4
Basic	1,853	35.5
Secondary	1,471	28.2
Tertiary	675	12.9
Locality of Residence		
Urban	3,064	58.7
Rural	2,156	41.3
Region		
Western	503	9.6
Central	468	9
Greater Accra	681	13.1
Volta	468	9
Eastern	550	10.5
Ashanti	783	15
Brong Ahafo	494	9.5
Northern	520	10
Upper East	389	7.5
Upper West	364	7

Source: Field data, 2016

4.2.1 Usage and Adoption of Mobile Money

In the context of this study, adoption of MoMo is defined as those who have registered for a MoMo service on any of the four networks. There are others who may not be registered for the MoMo service, yet they use the service to either send or receive money through MoMo agents. The results showed that of the 64% of Ghanaians who have ever used MoMo to make transactions, 58% of them have registered for a MoMo service. This means that only 6% of the people who have ever used MoMo before have not adopted the service. This data shows that more than half of Ghanaians have adopted MoMo services.

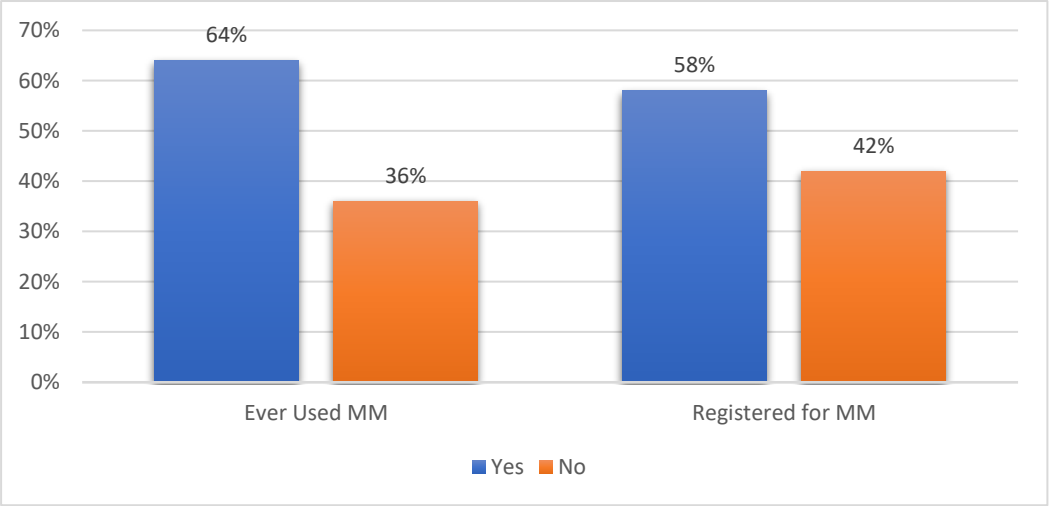

Figure 4. 1: Use and Adoption of Mobile Money Services

Source: Field data, 2016

4.2.2 Adoption of Mobile Money across Mobile Networks

The data showed that some Ghanaians have registered for MoMo service on more than one service provider. The study therefore categorized those who have registered for MoMo services into single network, dual networks and use of three networks. A majority of the respondents had registered for the MTN MoMo service. MTN is the leading telecommunication company in Ghana and was the first company to start

MoMo operations in Ghana in July 2009, followed by Airtel in March 2010, Tigo in October 2010 and Vodafone in July 2015 (Saliu, 2015). Also, among the four networks, MTN is the network with the highest customer base in Ghana. The statistics by the National Communication Authority (NCA) show that as at the end of September 2017, MTN continued to lead the industry's share of voice subscription by 47.6%, followed by Vodafone 24.3%, Tigo 14.7% and Airtel 11.4% (NCA, 2017).

Looking at the results in Table 2, it can be seen that even though Vodafone comes second in terms of the industry's share of voice subscription, in terms of MoMo use, it takes the third position whilst Tigo takes the second place. This might be because it only entered the MoMo market in 2015, five years after Tigo's entry into the market. What is surprising, however, is the position of Airtel relative to Vodafone. Airtel entered the MoMo market in 2010 and Vodafone came later in 2015, yet the proportion of Ghanaians registered on Vodafone (4.1%) was relatively higher than Airtel (3.1%) by one percentage point. This might be attributed to the fact that the proportion of Ghanaians using Vodafone is higher than Airtel users.

Table 4. 2: MoMo Networks

Network	Freq.	Percent
Major Network		
MTN	2,288	76.1
Tigo	206	6.9
Vodafone	124	4.1
Airtel	94	3.1
Dual Networks		
MTN-Airtel	56	1.9
MTN-Tigo	71	2.4
MTN-Vodafone	110	3.7
Airtel-Tigo	10	0.3
Tigo-Vodafone	12	0.4
Airtel-Vodafone	7	0.2
Three Networks		
MTN-Airtel-Tigo	10	0.3
MTN-Airtel-Vodafone	3	0.1
MTN-Tigo-Vodafone	7	0.2
All Networks	9	0.3
Total	3,007	100

Source: Field data, 2016

4.2.3 Period of Mobile Money Adoption

For those who have registered on MoMo, the study sought to examine how long they have been using MoMo. The result supports the stages of adoption predicted by the Innovation Diffusion Model. According to Rogers (1995), adopters of innovation can be categorized into five, based on the period they adopted the innovation. The first category is usually a small segment of the population who adopt the technology at its early stage, who he called innovators. The next is the early adopters, who are also usually quite few, but relatively more than the innovators. The third and fourth groups are the early majority and the late majority respectively, and last are the few laggards.

Mobile Money innovation started in Ghana seven years before this data was collected (2009 – 2016). The results presented in Figure 4.2 shows that the proportion of Ghanaians who adopted it the year it started operation (who can be called innovators in the context of Rogers Innovation Diffusion Model) was just 9.2%. Those who have been using the service for the past 4 – 6 years, which is one to three years after the inception of the service (2010 - 2012), constitute 17.4% of current users, which is 8.3 percentage point higher than the innovators. Those who have been using it for 1 – 3 years, which is between four to six years after the service began (2013 – 2015) constitute 20.5%. Finally, if we consider those who have used the service for less than a year (2016) as the late majority (52.9%), then it can be concluded that the increasing MoMo adoption in Ghana is a recent and accelerating phenomenon.

Rogers (1995) and Straub (2009) both explain that the majority of people usually take time to assess the merits of an innovation before making the decision to adopt it. When it has been established within a social system that an emerging innovation's benefits far outweigh its cost, the spread of the innovation becomes fast. Having as high as 52.9% of Ghanaians adopting it in 2016 compared to 5.7% in 2015 shows that people have now broadly accepted that the potential benefits outweigh the cost.

According to Khraisha and Arthur's (2018) evolution theory, the survival and diffusion of a new financial innovation within a population is dependent on time. At the initial inception of the innovation, only a few people will adopt the services whilsts the majority of the population observes the performance of the innovation. Over time, the proportion of people who will adopt the service increases and this causes the suppliers of the innovation to periodically enhance the quality of the innovation to meet the needs of the population. Thus, the services and products users enjoy on the innovation will also evolve over time as new players enter the market. Among other things, Johnston

and McConnell (1989) explained that the security of the financial innovation is critical to increase adoption and diffusion of the innovation.

MoMo started mainly as a service for making transfers. Over time, new products and services have been added to the service. Users can now pay bills (e.g. water and DSTV bills), buy airtime, make purchases and pay for flight ticket through their MoMo account. Some organizations even pay the salaries of their workers through mobile money. Many restaurants, shops, health facilities and supermarkets are accepting payments through MoMo. Thus, people are increasingly seeing MoMo as a secure means for holding money instead of holding 'hard currency'. This might have accounted for the recent increases in MoMo adoption.

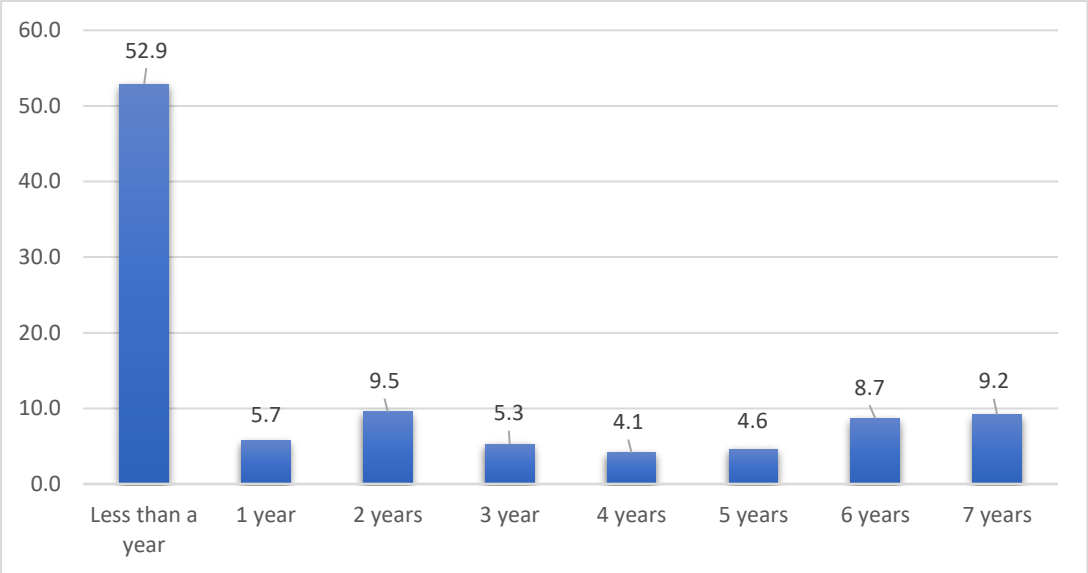

Figure 4. 2: Period of Using MoMo Service (%)

Source: Field data, 2016

4.2.4 MoMo Adoption by the Demographic Characteristics of Respondents

An assessment of the difference in adoption of MoMo across the demographic characteristics of the respondents shows that there is a statistically significant difference between the rate of adoption among people of different age categories, educational

status, locality of residence and region of residence. There was no statistically significant difference between the rate of adoption among males and females.

As expected, the rate of MoMo adoption among the youth (61%) was significantly higher than the adults and the aged (56% and 50%, respectively; Table 4.3). In the same vein, the rate of adoption among the adult population (55.9%) was also found to be significantly higher than the aged. Since MoMo is a technology-based application, it is not surprising that the rate of adoption among the youth is higher than the adults and aged. Literature has shown that the increasing adoption of mobile phone among the youth is largely influenced by their demographic characteristics (such as age, gender, educational level and income), personal factors (such as preference, fashion, personal gratification), and facilitating conditions (such as network access) (Lesitaokana, 2016; Hahn & Kibora, 2008; van Biljon & Kotze', 2008; Donner, 2005; Pagani, 2004; Teo & Pok, 2003; Carroll et al., 2003). The desire to interconnect, especially through the internet and internet-based applications, the need to establish communication, and the desire to access the multimedia services embedded in mobile phones continue to drive the youth into adopting mobile phones (Roberts & Pick, 2008; Peters & Allouch, 2005; Carroll et al., 2003; Leung & Wei, 2000). Given that MoMo is a mobile phone-based application, it is not surprising that the adoption rate is higher among the youth compared to the aged.

In terms of education, the rate of adoption increases with increasing levels of education. The results showed that the rate of MoMo adoption is significantly lower at 38.9% among those with no formal education than the 56.6% among those with basic education. This proportion further rises to 64.7% among those with secondary education and rises further to 79.6% among those with tertiary education.

The results further show that the rate of adoption among residents in urban areas is significantly higher than those in the rural areas by 14.5 percentage points. In the urban areas, there is easy access and proximity to MoMo services as compared to their rural counterparts. Hence, the high rate of adoption. The results also show that there is significant regional difference in the rate of adoption. The rate of adoption was found to be higher in the three coastal regions, with the Central region recording the highest rate of adoption (65%), followed by the Greater Accra region (61.1%) and the Western region (60.6%). The rate of adoption in the Eastern region (60.6%) was the same as the rate of adoption in the Western region. However, the rate of adoption in the three Northern regions and in the Brong Ahafo region was found to be lower than in all the other regions. Specifically, the Brong Ahafo region (50.8%) and the Upper West region (50.8%) recorded the lowest rate of adoption compared to all the other regions. These results may probably be accounted for by the relatively low income (or high poverty) status of these regions and probably also with lower levels of educational attainment as compared to the Greater Accra region.

Table 4. 3: Adoption across Demographic Characteristics of Respondents

	Yes (%)	No (%)	Chi-square Test
Gender			
Male	56.8	43.2	$\chi2 = 1.98$
Female	58.8	42.2	Pr = 0.160
Age Category			
Youth	61	39	$\chi2 = 27.78$
Adults	55.9	44.1	Pr = 0.000
Aged	49.9	50.1	
Educational Status			
No Formal Education	38.9	61.1	
Basic	56.6	43.4	$\chi2 = 339.55$
Secondary	64.7	35.3	Pr = 0.000
Tertiary	79.6	20.4	
Locality of Residence			
Urban	63.7	36.3	$\chi2 = 108.47$
Rural	49.2	50.8	Pr = 0.000
Region			
Western	60.6	39.4	
Central	65.0	35.0	
Greater Accra	61.1	38.9	$\chi2 = 36.57$
Volta	58.6	41.5	Pr = 0.000
Eastern	60.6	39.5	
Ashanti	56.5	43.6	
Brong Ahafo	50.8	49.2	
Northern	54.8	45.2	
Upper East	55.8	44.2	
Upper West	50.8	49.2	

Source: Field data, 2016

4.3 Drivers of Mobile Money Adoption

Table 4.4 presents the results of the probit analysis estimating the drivers of MoMo adoption and how it varies across gender and age. The results show that males are 2.5% less likely to adopt MoMo as compared to female. This contradicts the body of literature that suggests that males are more likely to adopt MoMo or technology as compared to

women because men tend to be more adventurous (Jambulingam, 2013; Amin et al., 2006; Wan, Luk & Chow, 2005; Akinci, Aksoy & Atilgan, 2004) and innovative than females (Demirci & Ersoy, 2008). Empirical studies have established that women tend to be more anxious toward the adoption and use of new technologies, especially at the early stages, and this affects their adoption attitude (Lee et al., 2011; Shin, 2009). The plausible explanation might be that women, who are more likely to be financially excluded, find mobile money as a more convenient and secure tool to keep their funds.

The results also show that education is a significant predictor of mobile money adoption. The probability of MoMo adoption increases with increasing level of educational attainment relative to those with no education. The results show that the effect of education on the probability of MoMo adoption increases from 8.6% among those with basic education to 11.3% among those with secondary education and to 19.1% among those with tertiary education, compared to those with no education. Thus, the higher the level of ones' education, the higher the chance of the person to adopt MoMo. This is not surprising, because MoMo is a technology that people with higher education will find it easier to use as compared to those with lower levels of education. This finding confirms the results of the study by Osei-Assibey (2015), who found education to be a significant predictor of MoMo adoption in Ghana. A recent survey in Canada by Riddell and Song (2017) also found that increasing levels of education increase the probability of people (workers) to use computers on their jobs compared to those with less education. Higher formal education leads to greater knowledge about technologies and ease in using technology-based applications. Dzokoto and Appiah (2014) found that in Ghana, lower levels of education among the majority of the Ghanaian inhibit the adoption of MoMo. Therefore, as the levels of education increases, the probability of adoption also increases.

Also, one location of residence has an effect on the chances of MoMo adoption. The urban residents are 5.7% more likely to adopt MoMo as compared to those living in rural areas, and this is statistically significant. The positive association between urban residence and MoMo adoption supports the work of McKay and Kaffenberger (2013), who found adoption of MoMo to be higher in urban areas than rural areas. Balan et al. (2009) attributed the low adoption rate in rural areas to structural and technical rigidities such as lack of network coverage, which is one of the main facilitating conditions necessary to influence adoption.

Regional differences were also observed. Residents in Western Region (11.9%), Central (9.7%), and Upper East (13.6%) regions have a higher propensity to adopt MoMo relative to residents in the Greater Accra region. However, residents in Ashanti region has a lower (4.5%) propensity to adopt MoMo, relative to residents in the Greater Accra region. The relationship between region and adoption might be attributed in part to the characteristics of the region (e.g. level of income, rate of urbanization) as well as the density of financial institutions, which affect the proximity of people within the region to access financial services. Statistics from the 2010 Population and Housing Census show that the Upper East region is only 21% urbanized, Western 40% and Central 47.1% compared to Ashanti region with as high as 61% urbanization and Greater Accra, which is 90.5% urbanized (Ghana Statistical Service, 2012). Since financial institutions tend to focus on dense urban areas, people within the Greater Accra and Ashanti regions are therefore expected to have relatively easier access to financial institutions and to enjoy a wider range of financial services compared to residents in the Upper West region. Other factors such as high income level and high educational attainments characterizing urbanized regions may be contributory factors.

The results of the probit analysis presented in Table 4.4 further reveal that, for the theory variables, only perceived usefulness and social influence have a positive effect on the probability of adoption, with perceived usefulness having a higher impact on adoption than social influence. From the table, the chance of people adopting MoMo because they perceive it to be useful to their livelihood was 21.7% higher than of those who do not perceive it to be useful to them. In the same way, the probability of people adopting MoMo because they were influenced by other people (i.e. friends, colleagues, relatives etc.) was 6.6% higher than of those who were not influence by others. As expected, cost of transaction and distance to a MoMo service provider decrease the chances of adoption. The results show that the cost of transaction, which is the charge MoMo users pay for making transactions, was found to reduce the chance of adoption by 5.7%. Also, where the user perceives the service provider to be farther away from him/her, thus, considers the distance to be far, the probability of adoption reduces by 4%.

The positive effect of perceived usefulness on adoption confirms Davis' (1989) Technology Acceptance Model (TAM) and Venkatesh et al.'s (2003) Unified Theory of Acceptance and Use of Technology. Many studies[3] on technology adoption have all found perceived usefulness to have a positive effect on technology adoption. Thus, the positive impact of perceived usefulness on technology adoption has been well established in the literature. Davis et al. (1989) and Venkatesh et al. (2003) in both the original Technology Acceptance Model (TAM) and the modified Technology Acceptance Model (TAM2) found perceived usefulness to be the factor with the highest

[3] Such as Padashetty and Krishna, 2013; Guhr, Loi, Wiegard and Breitner, 2013; Sim, Tan, Ooi, and Lee, 2011; Zhou, 2011; Kim, Mirusmonov, and Lee 2010; Lee, 2009; Kim, Chan, & Gupta, 2007; Hong, Thong, Moon, and Tam, 2006; Agarwal and Karahanna, 2000; Venkatesh and Morris, 2000.

impact on technology, as found in this study. The negative effect of cost of transaction on chance of adoption supports many scholarly works which have found that high cost of using a financial product reduces adoption (Fungácová & Weill, 2015; Bampoe, 2015; Allen et al., 2012; Tobbin, 2012).

On the other hand, ease of use (as in the case of TAM), which is the same as complexity in the case of IDT and effort expectancy in the case of UTAUT, was found not to have any significant effect on adoption (p-value > 0.05). This finding is not consistent with the adoption literature, which finds that ease of use (as well as perceived usefulness) has a significant positive effect on adoption (Venkatesh et al., 2003; Davis, 1989, 1986). This means that in Ghana, the decision to adopt MoMo is not influenced by the effort required in using the service. Due to the strong social ties in the Ghanaian culture, people who find it difficult in making MoMo transfers may easily seek the assistance of family or friends. Hence, the strong emphasis on perceived usefulness and not ease of use.

Further analyses were conducted to assess if the drivers of adoption vary across the characteristics of Ghanaians, beginning with gender. The characteristics considered were gender, age, education and locality of residence. The model was run separately for each of the characteristics. In Table 4.4, the gender (male and female) and age (youth, adult and aged) analyses have been presented.

The results show that the drivers of MoMo adoption vary by gender. Perceived usefulness and cost of transaction were significant predictors of MoMo adoption for only males but not for females. Only social influence was a predictor for both males and females. The effect of social influence on females' decision to adopt MoMo (7.5%) was found to be approximately 2.3 percentage point higher than males' chance of

adoption (5.2%). Unexpectedly, the speed to make transactions using MoMo decreases the probability of MoMo adoption among males (10.9%) but not among females.

For the control variables, the results show that the probability of MoMo adoption for both males and females increases with increasing levels of educational attainment. This means that no matter one's sexual orientation, the higher the level of educational attainment, the higher the chance of adopting financial innovation (Riddell &and Song, 2017; Osei-Assibey, 2015). The results also show that the chance of adoption among males and females in urban areas was significantly higher than those in the rural areas. This supports the argument that there a high concentration of financial institutions in the urban areas, which offer residents the opportunity to become financially included (Collins et al., 2009).

Differences in the probability of MoMo adoption were seen across the ten regions in relation to the gender of the respondent. For instance, males in Volta (11.2%) and Ashanti (11.5%) regions have a lower propensity to adopt MoMo, relative to males in the Greater Accra region. However, no significant association was observed among females in the two regions as compared to females in the Greater Accra region. But for regions such as the Western, Central and Upper East regions, the probabilities of MoMo adoption among males and females in those regions were higher than for their counterparts in the Greater Accra region. In sum, the results show that before males made a decision to adopt MoMo, they considered its usefulness to their livelihood, the cost involved in using the service, the speed of transaction as well as the influences from other people before making the decision. On the other hand, females' major decision to adopt MoMo was based largely on social influence. All these factors were, however, mediated by their levels of education, locality of residence and region of residence.

Also, the effects of the independent variables on MoMo adoption were found to vary across age groups, as presented in Table 4.4. The effect of perceived usefulness on the propensity of adoption was found to be significantly higher among the aged (63.5%) as compared to the youth (23.4%) and adults (14.2%). The researcher had expected the chances of adoption to be higher among the aged because MoMo serves as a conducive and secure channel to receive remittances from their relatives as compared to the modern banking system or traditional 'send by bus' system (IOM and ACP Observatory on Migration, 2014).

Cost of transaction was found to inversely affect the chances of adoption among the youth and the adults, but not for the aged. With the emergence of mobile banking applications, which perform similar functions as MoMo and which have monthly bank charges relatively lower than MoMo, the 2% charges on MoMo transfers might seem high for people within the working-class category and the youth. As expected, social influence had a positive impact on the chances of MoMo adoption among the youth (8.9%) and the adults (5.2%) but not for the aged. Proximity from MoMo service provider reduced the probability of adoption by 8.4% only among the youth, but not for the adults and aged.

For the control variables, the results show that as the educational level of youth increased from basic to tertiary, the chances of adoption also increased from 15.5% to 27.8% relative to those with no education, respectively. Among the adult population, education positively influenced adoption among those with basic education (4.9%) and tertiary education (15.6%) but not those with secondary education compared to those with no education. Similarly, among the aged, education influenced adoption among those with secondary education (20.7%) but not for those with basic or tertiary education relative to those with no education.

The effect of urban residence on the chances of adoption was found to be higher among the aged (15%) as compared to the youth (4.9%) and the adults (5.5%). The region of residence was found to be a significant predictor of adoption for the youth and the adults but not for the aged. The youth in the Western, Central and Upper East regions were more likely to adopt MoMo as compared to the youth in Greater Accra region. For the adults, the chances of adoption increased among those in the Western and Central regions only, but reduced among those in the Volta, Eastern, Ashanti and Northern regions as compared to adults in the Greater Accra region. For the aged, the chances of adoption increased by 27.9% among those in the Central region only as compared to the aged in the Greater Accra region. In sum, for the youth and adults, perceived usefulness and social influence had a positive effect on the chances of adoption whilst cost of transaction negatively influenced adoption. However, only perceived usefulness influenced the chance of adoption among the aged.

Table 4. 4: MoMo Adoption across Gender and Age

	Overall Model	Male	Female	Youth	Adult	Aged
Male	-0.025*			-0.017	-0.033	-0.049
	(0.013)			(0.018)	(0.020)	(0.052)
Age (Ref: Aged)						
Youth	-0.001	0.013	-0.013			
	(0.022)	(0.029)	(0.035)			
Adult	0.006	-0.000	0.017			
	(0.022)	(0.029)	(0.034)			
Education (Ref: No Education)						
Basic	0.086***	0.087***	0.085***	0.155***	0.049*	0.105
	(0.021)	(0.030)	(0.030)	(0.039)	(0.029)	(0.070)
Secondary	0.113***	0.102***	0.125***	0.201***	0.036	0.207***
	(0.022)	(0.030)	(0.032)	(0.037)	(0.032)	(0.067)
Tertiary	0.191***	0.196***	0.181***	0.278***	0.156***	0.128
	(0.022)	(0.030)	(0.033)	(0.037)	(0.031)	(0.085)
Locality urban	0.057***	0.057***	0.054**	0.049***	0.055**	0.150***
	(0.014)	(0.018)	(0.022)	(0.019)	(0.022)	(0.055)
Region (Ref: Greater Accra)						
Western	0.119***	0.093***	0.123***	0.113***	0.067*	
	(0.025)	(0.034)	(0.037)	(0.035)	(0.038)	
Central	0.097***	0.064*	0.124***	0.068*	0.092***	0.279***
	(0.027)	(0.036)	(0.037)	(0.040)	(0.035)	(0.098)
Volta	-0.044	-0.112***	0.026	-0.016	-0.078*	0.071
	(0.031)	(0.043)	(0.043)	(0.044)	(0.045)	(0.109)
Eastern	-0.038	-0.066*	-0.015	-0.011	-0.102**	0.150
	(0.029)	(0.040)	(0.041)	(0.040)	(0.044)	(0.107)
Ashanti	-0.045*	-0.115***	0.012	-0.022	-0.110**	0.154
	(0.027)	(0.041)	(0.035)	(0.036)	(0.043)	(0.100)
Brong Ahafo	0.015	-0.040	0.063	0.033	-0.028	0.160
	(0.028)	(0.040)	(0.039)	(0.039)	(0.043)	(0.106)
Northern	-0.009	-0.046	0.051	0.039	-0.096*	-0.051
	(0.029)	(0.037)	(0.050)	(0.036)	(0.051)	(0.153)
Upper East	0.136***	0.100***	0.161***	0.140***	0.064	
	(0.026)	(0.035)	(0.039)	(0.038)	(0.042)	
Upper West	0.026	-0.012	0.057	0.050	-0.043	0.193
	(0.034)	(0.045)	(0.051)	(0.044)	(0.059)	(0.132)
Perceived usefulness	0.217***	0.310***	0.047	0.234***	0.142**	0.635***
	(0.040)	(0.053)	(0.079)	(0.054)	(0.066)	(0.180)
Easy to Use	-0.005	0.054	-0.114*	-0.078*	0.039	0.076
	(0.031)	(0.038)	(0.065)	(0.046)	(0.049)	(0.120)
Cost of Transaction	-0.057***	-0.070***	-0.045*	-0.054**	-0.077***	-0.039
	(0.017)	(0.023)	(0.025)	(0.023)	(0.027)	(0.063)
Quick Transaction	-0.065	-0.109*	-0.050	-0.046	-0.076	-0.105
	(0.041)	(0.062)	(0.064)	(0.056)	(0.072)	(0.131)
Convenience	-0.012	0.032	-0.089	0.032	-0.015	-0.305**
	(0.039)	(0.049)	(0.071)	(0.053)	(0.063)	(0.121)
Availability/Proximity	-0.040*	-0.046	-0.023	-0.084***	-0.012	0.045
	(0.022)	(0.028)	(0.034)	(0.032)	(0.034)	(0.083)

Social Influence	0.066***	0.052***	0.075***	0.089***	0.052**	-0.010
	(0.014)	(0.019)	(0.021)	(0.019)	(0.022)	(0.055)
Observations	3,343	1,845	1,498	1,687	1,332	270
Pseudo R^2	0.096	0.131	0.075	0.119	0.096	0.125
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.002

Estimated marginal effects are presented and robust standard errors are in parentheses.
Standard errors are robust to heteroscedasticity
* p<0.05, ** p<0.01, *** p<0.001
Source: Field data, 2016

Further analysis was conducted to assess if the factors influencing MoMo adoption vary across the levels of educational attainment of the respondent. The results of the probit analysis show that the effect of perceived usefulness on adoption cuts across all the levels of education (see Table 4.5). For those with no education, the chances of adoption for those who consider MoMo to be useful to them was 19% higher than those who do not consider it to be useful. The effect of perceived usefulness on adoption increased to 24.2% and 24.4% among those with basic and secondary education, respectively. The effect of perceived usefulness on the probability of adoption among those with tertiary education was 20.7%.

Cost of transaction negatively influenced the chances of adoption among those with no education and secondary education but not among those with basic and tertiary education. The results show that the negative effect of cost of transaction on the probability of adoption was relatively higher among those with no education (13.1%) as compared to those with secondary education (6.2%). Similarly, social influence was a significant predictor among those with no formal education, basic education and secondary education. The results show that the effect of social influence on the chance of adoption was higher among those with no formal education (10.9%) as compared to those with basic (5.8%) and secondary education (6.2%).

For the control variables, the probability for youth and adults with tertiary education to adopt MoMo was approximately 17% and 16.3% higher than for the aged, respectively. However, chance of adoption reduced by 8.6% among adults with secondary education compared to the aged. Locality of residence influenced the adoption among those with no education and basic education but not for those with secondary and tertiary education. The results show that probability of adoption among urban residents with no formal education or with basic education only were 7.6% and 8.7% higher than their rural counterparts with the same levels of education respectively.

Region of residence was a significant predictor of adoption among those with no formal education, basic and secondary education, but not for those with tertiary education. Those with no formal education living in the Western and Upper East regions were 16.9% and 22.9% more likely to adopt MoMo as compared to those with no formal education living in the Greater Accra region respectively. Similarly, those with only basic education living in the Western, Central and Upper East regions were 14%, 15.4% and 17% more likely to adopt MoMo as compared to those with basic education living in the Greater Accra region. Those with secondary education living in the Western and Upper East regions were 9.6% and 10.4% more likely to adopt MoMo as compared to those with secondary education living in the Greater Accra region. A cursory look at the rates of adoption across the various educational levels in regions like the Western and the Upper East, shows that the rate of adoption reduces as the level of education increases. Thus, in terms of educational attainment, those with tertiary education make the decision to adopt MoMo because they perceive it to be useful to their livelihood. For those with no education or who have attained secondary education, the factors that influence their decision to adopt MoMo are perceived to be usefulness, social influence (both having a positive effect on adoption) and cost of transaction (negative effect).

Lastly, for those with basic education, only perceived usefulness and social influence drive them to adopt MoMo.

The final analysis was to assess whether the effect of the independent variables on adoption vary across the locality of residences (urban and rural) of Ghanaians. The effect of perceived usefulness on the probability of adoption was higher among rural residents (28.9%) as compared to urban residents (18.5%). On the other hand, the effect of social influence on the chance of adoption was slightly higher in the urban areas (7.8%) than in the rural areas (4.6%). Cost of transaction negatively influenced the probability of adoption in urban areas but had no effect on adoption in the rural areas.

For the control variables, the results show that even though the effect of education on adoption increases with increasing level of education in both urban and rural localities, the marginal effects are higher in rural areas than in urban areas. For instance, for those with tertiary education, the effect of education on adoption among rural residents was 23% whilst for urban residents it was 17.7%. Differences were observed in the effect of region on probability of adoption in both urban and rural areas. For instance, the chances of adoption were higher among urban residents in the Western (13.7%) and the Central (7.1%) regions as compared to the Greater Accra region. However, apart from the Western, Central and Upper East regions, where no significant differences were observed, the probability of adoption was lower for rural residents in all the other regions as compared to rural residents in the Greater Accra region. In sum, even though similar factors influence the probability of MoMo adoption in both urban and rural areas, cost of transaction negatively influenced adoption in urban areas, having controlled for gender, age, education, locality of residence and region of residence.

Table 4. 5: MoMo Adoption across Education and Locality of Residence

	No Education	Basic	Secondary	Tertiary	Urban	Rural
Male	-0.029	-0.025	-0.036	0.002	-0.021	-0.036
	(0.035)	(0.023)	(0.024)	(0.023)	(0.015)	(0.024)
Age (Ref: Aged)						
Youth	-0.066	0.002	-0.043	0.170**	-0.001	0.001
	(0.051)	(0.041)	(0.038)	(0.073)	(0.028)	(0.037)
Adult	0.011	0.022	-0.086**	0.163**	0.012	0.002
	(0.045)	(0.040)	(0.041)	(0.074)	(0.027)	(0.037)
Education (Ref: No Education)						
Basic					0.085***	0.084**
					(0.029)	(0.033)
Secondary					0.104***	0.130***
					(0.029)	(0.034)
Tertiary					0.177***	0.230***
					(0.029)	(0.036)
Locality urban	0.076**	0.086***	0.038	0.014		
	(0.038)	(0.025)	(0.025)	(0.028)		
Region (Ref: Greater Accra)						
Western	0.169*	0.140***	0.096**	0.035	0.137***	-0.037
	(0.089)	(0.045)	(0.041)	(0.039)	(0.022)	(0.070)
Central	0.156	0.154***	0.041	-0.002	0.071**	-0.000
	(0.099)	(0.043)	(0.047)	(0.049)	(0.031)	(0.067)
Volta	-0.126	-0.014	-0.026	-0.051	-0.018	-0.205***
	(0.096)	(0.050)	(0.061)	(0.061)	(0.035)	(0.070)
Eastern	-0.057	-0.029	-0.071		-0.043	-0.164**
	(0.102)	(0.057)	(0.045)		(0.032)	(0.071)
Ashanti	-0.041	-0.040	-0.048	-0.051	-0.004	-0.279***
	(0.096)	(0.049)	(0.042)	(0.043)	(0.027)	(0.075)
Brong Ahafo	-0.001	0.056	-0.020	-0.027	0.029	-0.142*
	(0.090)	(0.047)	(0.056)	(0.064)	(0.029)	(0.073)
Northern	-0.118	-0.004	0.024	0.030	0.024	-0.197**
	(0.093)	(0.065)	(0.044)	(0.032)	(0.029)	(0.077)
Upper East	0.229***	0.170***	0.104**	0.009	0.052	0.065
	(0.084)	(0.045)	(0.048)	(0.040)	(0.040)	(0.064)
Upper West	0.063	0.053	-0.007	-0.021	0.043	-0.127*
	(0.098)	(0.068)	(0.062)	(0.044)	(0.042)	(0.076)
Perceived usefulness	0.190**	0.242***	0.244***	0.207***	0.185***	0.289***
	(0.095)	(0.075)	(0.080)	(0.070)	(0.049)	(0.077)
Easy to use	0.069	-0.069	0.012		0.039	-0.070
	(0.073)	(0.060)	(0.062)		(0.042)	(0.048)
Cost of Transaction	-0.131***	-0.044	-0.062**	-0.022	-0.057***	-0.046
	(0.050)	(0.030)	(0.030)	(0.026)	(0.020)	(0.030)
Quick transaction	-0.127	0.009	-0.066		-0.077	-0.049
	(0.112)	(0.068)	(0.073)		(0.055)	(0.068)
Convenient	0.075	-0.007	-0.080	-0.023	-0.032	-0.008
	(0.095)	(0.068)	(0.088)	(0.058)	(0.053)	(0.060)
Availability / Proximity	-0.069	-0.063	0.011	-0.059	-0.047	-0.032
	(0.055)	(0.039)	(0.041)	(0.043)	(0.032)	(0.032)
Social influence	0.109***	0.058**	0.062**	0.039	0.078***	0.045*

	(0.036)	(0.025)	(0.026)	(0.026)	(0.016)	(0.025)
Observations	600	1,148	1,034	483	2,097	1,246
Pseudo R^2	0.126	0.072	0.064	0.104	0.084	0.122
Prob > chi2	0.000	0.000	0.000	0.008	0.000	0.000

Estimated marginal effects are presented and robust standard errors are in parentheses. Standard errors are robust to heteroscedasticity

* p<0.05, ** p<0.01, *** p<0.001

Source: Field data, 2016

4.4 Motivations for MoMo Adoption

Like any other innovation, people have different motives for adopting MoMo. The results of the descriptive analysis (refer to Appendix 1 for details) show that the major reason for adopting MoMo was to send and receive money (transfers). Approximately 87% of the respondents indicated that they use MoMo to receive money from family and friends, whilst 58% indicated that they use it to send money to their friends and relatives. Thus, the majority of MoMo users use the innovation for the purposes of receiving money from and sending it to their relatives and friends. Aside from transfers, a substantial proportion of the respondents (48%) also used MoMo as a means of saving money. Only a few of them use MoMo for transacting business, such as sending money to business partners (21%) or receiving money from business partners (26%). Only a fifth of the respondents indicated that they use it for making purchases (20.8). The least patronized service is using MoMo to pay utility bills.

The findings of this study are consistent with earlier studies which found sending and receiving money (transfers) to be the major reason for the adoption of MoMo (Gutierrez & Choi, 2014). In Kenya and Uganda, for instance, where MoMo adoption is relatively high, studies have shown that the dominant use of MoMo continues to be sending and receiving money, despite other services that the system offers its users (ITU, 2013; Klein & Mayer, 2011; Jack & Suri, 2011). Earlier works done in Ghana also found that

the majority of MoMo users use it for sending and receiving money to and from their friends and relatives (Dzokoto & Appiah, 2014; Sedzro, 2013).

An analysis was further conducted to assess how the characteristics of people affect their motivation for adopting MoMo. The results of the probit analysis presented in Table 4.6 show that compared to women, men are more likely to adopt MoMo for the purposes of transferring money to relatives and friends, transferring and receiving money to/from business partners and for making purchases. Receiving money from friends and relatives is a less important motive for men to adopt MoMo as compared to women. Compared to the aged, the main motives of the youth in adopting MoMo are to transfer and receive money to/from business partners, to make purchases, and for savings. Adults are more likely than the aged to adopt MoMo to transfer money to relatives or friends, transfer and receive money to/from business partners. Both the youth and adults adopt MoMo for business purposes and for savings. However, only the adults significantly use MoMo to remit funds to relatives and friends. There was no significant difference in the use of MoMo to receive funds from friends and relatives.

The results further show that the marginal effect of certain motives for adopting MoMo change with increasing levels of education. For instance, the main motives of those with basic education for adopting MoMo are to pay bills and for savings. However, those who have attained secondary and tertiary education adopt MoMo for diverse reasons: remitting and receiving funds to/from family and friends, for business purposes, for the payment of bills and for making purchases, and for savings purposes. Increasing levels of education enlighten people on the wide range of services available to them on MoMo. The results further show that in terms of locality of residence, compared to those in rural areas, urban residents are more likely to adopt MoMo in order to send money to their relatives and friends, for both business purposes and for making purchases.

Regional differences were also observed. Those in the Western and Central regions were more likely to adopt MoMo for business purposes and for savings purposes (sending and receiving money from business partners) as compared to those in the Greater Accra region. People in the Central, Ashanti, Upper East and Upper West regions also were more likely to adopt MoMo to make purchases as compared to those in the Greater Accra region. This means that at the regional levels, there might be other factors that motivate them to adopt MoMo, which are quite different from the demographic characteristics of the respondents.

Table 4. 6: Factors that Motivate MoMo Adoption

	Transfer Money to Relatives / friends	Receive Money to Relatives / Friends	Transfer money to Business Partner	Receive Money from Business Partner	Pay Bills	Make Purchases	Savings
Male	0.048***	-0.055***	0.077***	0.087***	-0.002	0.056***	0.015
	(0.017)	(0.012)	(0.014)	(0.015)	(0.006)	(0.014)	(0.017)
Age Category (Ref: Aged)							
Youth	0.047	-0.017	0.077***	0.077***	-0.007	0.096***	0.164***
	(0.030)	(0.019)	(0.021)	(0.023)	(0.011)	(0.022)	(0.030)
Adult	0.080***	-0.017	0.128***	0.129***	-0.011	0.019	0.095***
	(0.030)	(0.019)	(0.021)	(0.023)	(0.011)	(0.022)	(0.030)
Education (Ref: No Education)							
Basic	0.009	0.018	0.016	0.025	0.014**	0.004	0.082***
	(0.026)	(0.020)	(0.019)	(0.021)	(0.006)	(0.018)	(0.025)
Secondary	0.146***	0.069***	0.060***	0.063***	0.017***	0.126***	0.224***
	(0.027)	(0.020)	(0.021)	(0.022)	(0.006)	(0.020)	(0.026)
Tertiary	0.302***	0.106***	0.137***	0.107***	0.049***	0.226***	0.286***
	(0.028)	(0.020)	(0.025)	(0.026)	(0.010)	(0.025)	(0.029)
Locality (urban)	0.036**	0.002	0.030**	0.049***	-0.003	0.077***	0.019
	(0.018)	(0.013)	(0.015)	(0.016)	(0.006)	(0.015)	(0.018)
Region (Ref: Greater Accra)							
Western	0.064*	0.102***	0.138***	0.161***	0.011	-0.017	0.207***
	(0.035)	(0.025)	(0.033)	(0.036)	(0.015)	(0.028)	(0.036)
Central	-0.023	0.127***	0.179***	0.332***	-0.027**	0.081***	0.193***
	(0.036)	(0.024)	(0.034)	(0.035)	(0.011)	(0.031)	(0.036)
Volta	-0.016	0.015	-0.112***	-0.160***	-0.034***	-0.133***	0.059
	(0.035)	(0.028)	(0.026)	(0.028)	(0.010)	(0.023)	(0.037)
Eastern	-0.120***	0.035	-0.030	-0.062**	-0.024**	-0.058**	-0.111***
	(0.033)	(0.027)	(0.027)	(0.029)	(0.010)	(0.024)	(0.033)
Ashanti	0.012	-0.001	0.033	0.015	-0.010	0.067***	0.004
	(0.031)	(0.026)	(0.026)	(0.029)	(0.011)	(0.025)	(0.032)
Brong Ahafo	-0.169***	0.048*	-0.102***	-0.131***	-0.025**	0.035	-0.093**
	(0.036)	(0.027)	(0.026)	(0.029)	(0.011)	(0.030)	(0.036)
Northern	-0.117***	0.081***	-0.044	-0.044	-0.024**	-0.001	-0.014
	(0.036)	(0.026)	(0.027)	(0.031)	(0.011)	(0.027)	(0.036)
Upper East	-0.226***	0.101***	-0.075**	-0.139***	0.014	0.101***	0.045
	(0.041)	(0.028)	(0.029)	(0.031)	(0.018)	(0.035)	(0.041)
Upper West	-0.051	0.109***	-0.014	-0.072*	0.036*	0.148***	0.028
	(0.043)	(0.028)	(0.035)	(0.037)	(0.021)	(0.037)	(0.043)
Observations	3,343	3,343	3,343	3,343	3,343	3,343	3,343
Pseudo R^2	0.068	0.042	0.082	0.110	0.102	0.130	0.073
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Estimated marginal effects are presented and Standard errors are in parentheses. Standard errors are robust to heteroscedasticity

* p<0.05, ** p<0.01, *** p<0.001

Source: Field data, 2016

4.5 Challenges in Using MoMo

Among those who have registered for MoMo services, nearly a third (29.5%) indicated that they have experienced certain challenges in using the MoMo service. This is not surprising given that the majority of the users (53% (see Figure 4.2)) have been using MoMo service for less than a year.

Four major challenges were identified by MoMo users in Ghana (Table 4.7). These were network failures, high charges, difficulty in using the application and distance to vendors. The challenges were analysed across locality and age. Of all the four challenges, network failure was the major challenge confronting users across localities and age groups. As expected, the proportion of rural dwellers (18.3%) who cited difficulty in using the application as a challenge was more than the urban dweller. In the same way, the proportion of rural dwellers who complained about the long distance to vendors (31.7%) was significantly higher than the urban dwellers (9.2%). In terms of the age category, a significant difference was observed only in the difficulty people experienced in using the application. The results show that the proportion of the adults and aged who experienced some challenges in using the application were higher than for the youth, who might be expected to be more comfortable with this technology. The results of this study support the works of TCRA (2013) and Saliu (2015), who both found that network connectivity continues to remain the major challenge to the increasing and successful uptake of MoMo services. The issue of network connection has been found to be worse in the rural areas as compared to the urban areas, mainly due to lack of necessary infrastructure.

The respondents argued that the 2% service charge on every MoMo transfer makes the service costly when transferring large amounts, relative to using a savings account. Other scholars have, however, argued that the 2% MoMo service charge is relatively cheap if one takes into consideration the minimum balance required to operate a savings account, 'long distance to financial service providers, high time and high transportation cost (especially for rural residents) along with the associated risk of physical cash movement by remittance senders and recipients' (Munyegera & Matsumoto, 2018: 46). However, comparing the 2% service charge on MoMo transfers in Ghana to Kenya, for instance, the service charge in Ghana is slightly higher. In Kenya, service charges differ across networks due to competition. For instance, a transfer of KS 5,000 attracts a service charge of 1.5% on M-Pesa and Orange Money, 1.4% on Airtel Money and 0.8% on yuCash (USAID, 2011). The Ugandan government recently imposed tariffs on MoMo services, making it more costly to the poor than it used to be (Anyanzwa, 2019).

Table 4. 7: Challenges by Network and Location

	%	Locality			Age			
		Urban	Rural	χ^2	Youth	Adult	Aged	χ^2
Network failures	80.1	81.3	78.1	1.4	80.7	80.1	76.5	0.75
High charges	45.9	46.2	45.5	0.04	45.6	46	48.1	0.19
Difficulty using the application	13.8	11.3	18.3	9.3*	10.5	18.3	14.8	11.2**
Long distance to vendors	17.3	9.2	31.7	80.6***	16.5	18.3	18.5	0.56

Note: Proportion of users who have experienced challenges in using the service: 29.5%

* p<0.05, ** p<0.01, *** p<0.001

Source: Field data, 2016

4.6 Reasons for Non-Adoption

The data revealed that 2,208 of the respondents, representing 42.3%, have not adopted any MoMo service. They were asked reasons why they have not adopted MoMo. Among the many reasons cited for not registering for the service, the major one is the lack of use for the service (Refer to Appendix 2 for details). For those who indicated that they do not have any use for the service, the proportion of the urban dwellers were relatively higher than the rural dwellers. The next challenge explaining non-adoption was that some of them were studying it further before they would make the adoption decision. As indicated by Rogers' (1995) diffusion model, the later majority always study an innovation for some time before making a decision to adopt. Aside from these two major constraints to adoption, others have not adopted because they don't trust the innovation, the charges are high, they were not aware of it, or they fear that in the case of mobile theft, they may lose their money.

A probit analysis was conducted to estimate the effect of characteristics of the individual on the chance of not adopting MoMo for any of the above six reasons. The results (as presented in Table 4.8) show that, compared to women, the major reason why some men have not adopted MoMo is that they don't trust it. There is not really any (significant) difference between age groups in these challenges, even though the results show that adults are more likely than the aged to want to study it further and to fear theft.

Whilst those who have attained basic education are studying it further, those with secondary and tertiary education do not trust the service and are not satisfied with the high charges on MoMo transaction as compared to those with no formal education. Regional differences were also observed in the factors influencing non-adoption. The regional analysis showed that the major reason why people in the Western region have

not adopted the service is that they do not trust the service or they consider the service charges to be high as compared to residents in the Greater Accra region. Whilst residents in the Central region indicated that they were studying the service further, those in the Ashanti region indicated that they did not have a use for it at the moment as compared to their counterparts in the Greater Accra region. Those in the Brong Ahafo, Upper East and Upper West regions also indicated that they were studying it further. The reasons for non-adoption among residents in the Upper West region were lack of trust, high charges, not aware and were studying it further. Those in the Northern region also indicated that they were not aware of its existence.

Table 4. 8: Reasons for Non-Adoption of MoMo

	Don't trust it	High Charges	Have no use for it	Not aware of it	Studying further	Fear of Mobile theft
Sex (Male)	0.029**	-0.004	0.011	0.001	0.025	0.002
	(0.012)	(0.012)	(0.023)	(0.010)	(0.018)	(0.010)
Age (Ref: Aged)						
Youth	0.005	0.010	-0.001	0.007	0.045*	0.021
	(0.019)	(0.018)	(0.037)	(0.016)	(0.027)	(0.013)
Adult	0.003	0.011	-0.016	-0.008	0.058**	0.025*
	(0.018)	(0.017)	(0.035)	(0.015)	(0.027)	(0.013)
Education (Ref: No Education)						
Basic	0.016	0.012	-0.066**	-0.018	0.046**	0.010
	(0.013)	(0.013)	(0.028)	(0.013)	(0.022)	(0.013)
Secondary	0.028*	0.029*	0.044	-0.044***	0.005	-0.019
	(0.017)	(0.017)	(0.034)	(0.013)	(0.027)	(0.012)
Tertiary	0.076**	0.068**	-0.054	-0.031	0.018	0.050*
	(0.031)	(0.032)	(0.049)	(0.019)	(0.041)	(0.030)
Locality (urban)	0.015	0.008	0.039	-0.045***	-0.008	-0.028**
	(0.012)	(0.012)	(0.024)	(0.013)	(0.020)	(0.012)
Region (Ref: Greater Accra)						
Western	-0.036	0.083***	0.341***	-0.026	-0.071**	-0.069***
	(0.022)	(0.027)	(0.046)	(0.018)	(0.032)	(0.025)
Central	-0.037	-0.014	0.046	-0.011	0.174***	-0.082***
	(0.023)	(0.019)	(0.051)	(0.021)	(0.045)	(0.024)
Volta	-0.037	-0.038**	-0.173***	-0.008	0.054	-0.067**
	(0.025)	(0.016)	(0.050)	(0.022)	(0.044)	(0.027)
Eastern	-0.051**	0.004	-0.076	0.002	-0.087***	-0.048*
	(0.022)	(0.022)	(0.051)	(0.024)	(0.033)	(0.028)
Ashanti	-0.006	0.026	0.207***	0.018	-0.002	-0.053**
	(0.023)	(0.020)	(0.044)	(0.020)	(0.033)	(0.025)
Brong Ahafo	0.004	-0.025	-0.068	-0.026	0.114***	-0.038
	(0.027)	(0.017)	(0.048)	(0.018)	(0.041)	(0.028)
Northern	-0.016	-0.024	0.052	0.047*	-0.051	-0.032
	(0.026)	(0.018)	(0.052)	(0.027)	(0.035)	(0.031)
Upper East	-0.029	0.032	-0.041	0.022	0.291***	-0.044
	(0.025)	(0.026)	(0.052)	(0.025)	(0.048)	(0.029)
Upper West	0.086**	0.098***	-0.034	0.075***	0.081*	-0.046
	(0.036)	(0.033)	(0.052)	(0.029)	(0.043)	(0.028)
Observations	1,877	1,877	1,877	1,877	1,877	1,877

Estimated marginal effects are presented and Standard errors are in parentheses. Standard errors are robust to heteroscedasticity

* p<0.05, ** p<0.01, *** p<0.001

Source: Field data, 2016

4.7 Conclusion

The results of this study have shown that the drivers of MoMo adoption indeed vary across the individual demographic characteristics of people. Earlier studies on drivers of MoMo adoption in Ghana (such as Amoh, 2016; Osei-Assibey, 2015) found

perceived usefulness, ease of use/complexity, perceived risk, cost of transaction, relative advantage, trust and social influence as significant factors reinforcing each other to influence individual adoption decisions. However, in this study, among these factors, only perceived usefulness, cost of transaction and social influence were found to significantly influence MoMo adoption. These factors are consistent with the tenets of the technology acceptance model. The effect of these three factors on the probability of MoMo adoption was found to vary across the gender, age, level of educational attainment, locality of residence and region of residences. These results support Venkatesh et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT), which states that the drivers of technology tend to vary when the demographic characteristics of people are taken into consideration. The results also support the economic theory dimension of Khraisha and Arthur's (2018) meta-theory, which states, among other things, that households or individuals adopt certain financial tools to enable them save, borrow and build assets (Khraisha & Arthur, 2018). This finding is consistent with the innovation diffusion model. The results show that even though MoMo operation began in 2009, the rate of adoption started increasing only in recent years.

The study also found that the major motivation for the adoption of MoMo is for the purpose of transfers. Likewise, in Kenya, Uganda and Tanzania, where MoMo adoption is high, the predominant use continues to be sending and receiving money, even though there are other financial products the service offers its users. The results show that in Ghana, besides transfers, people are also adopting it for business purposes (especially youth), paying bills, making purchases, and, most importantly, as a means of savings. The savings motivation shows that, gradually, some segment of the population is using the service as a means of managing their income and not just for transfers. Literature

has established that even those who earn little, when given the opportunity to save, are able to save over time, and that MoMo offers such people a convenient means to save and earn interest on the savings.

Despite the usefulness of MoMo to improving the wellbeing of Ghanaians, the research found that network failure represents a major challenge facing users. Furthermore, the transaction charges associated with MoMo transfers were considered to be high. Some of the people, especially those in the rural areas, complained about the difficulty in using the application. These challenges need to be addressed in the context of the dynamics of the Ghanaian population.

Just as the drivers of adoption vary across the characteristics of the respondents, the reasons for non-adoption were also found to vary across the characteristics of the population. Worth noting among the factors influencing non-adoption is the lack of trust in the MoMo service, especially among men and those who have attained higher education (secondary and tertiary levels). Those with higher education, who are mostly among the financially included, were more likely than those with less education to refuse to adopt MoMo service because they consider the transaction charges to be high. Given that those who have adopted MoMo complained about the high transaction charges and the same factor is a major constraint inhibiting adoption, proactive stakeholder engagement is needed to reconsider the charges on MoMo transfers if growth in adoption is to continue. If MoMo is being used as a tool for financial inclusion, as stated in the Bank of Ghana regulations, then the charges for accessing financial service through MoMo must be competitive with other formal financial services.

CHAPTER FIVE

MOMO AND THE USE OF FORMAL FINANCIAL SERVICES

5.1 Introduction

The rate of MoMo (MoMo) adoption across developing and emerging economies has 'leapfrogged' the provision and adoption of formal banking services (Aron, 2018). MoMo started in Ghana as a service for making and receiving transfers, mainly peer-to-peer (P2P) transfers and buying of airtime. Through partnership with service providers, other services such as payment of utility bills, DSTV bills, air tickets, salaries of workers and even taxi fares, among many others, have been added to the MoMo service. Micro-credit, savings and micro-insurance services, which are key indicators of financial inclusion, are currently available through the service (Bank of Ghana, 2017).

Available statistics from the Bank of Ghana payment systems' annual report show that between 2012 and 2017, the number of registered MoMo customers increased by 534% and active MoMo customers increased by as high as 3,119%. Comparatively, the data further show that by December 2017, whilst the number of registered MoMo customers was 23,947,437, the number of E-zwich card users was only 2,364,456, and mobile banking customers was 2,110,984. The statistics also show that whilst the three MoMo operators (MTN, AirtelTigo and Vodafone) had 151,745 active agents across the country, the 34 banks had only 1,491 branches. Total ATMs across the country (for both banking and non-banking institutions) as at December 2017 was only 2,044 and point of sales terminals was only 7,356 (BoG Payment Systems Report, 2016 and 2017). These statistics clearly show that among the various tools for driving financial inclusion, MoMo is currently the most widely accepted and adopted tool. It is therefore

not surprising that in June 2018, the volume of non-cash retail payments through MoMo overtook the volume of cheque payments. The figures show that whilst the volume of transactions through MoMo reached 981.6 million, the volume of retail payments using cheques was 7.3 million (Korankye, 2018).[4] With this increasing adoption of MoMo services in Ghana, it is expected that MoMo will drive financial inclusion by not only providing users with a service to make transfers but will graduate them to use other forms of formal financial services such as savings, obtaining credit and buying insurance.

This chapter assesses the impact of MoMo on the use of formal financial services using the 2014 and 2017 World Bank Findex datasets. Of the four basic indicators for measuring financial inclusion (i.e. ownership of account, access to savings, credit and insurance), the Findex survey collected information on three (i.e. ownership of account, access to savings and credit). Hence, the analysis does not include insurance. Ownership of account, which is the basic definition of financial inclusion, includes ownership of account at any financial institution (not just universal banks and rural banks) as well as ownership of a MoMo account. It should, however, be noted that although MoMo companies are formal institutions and their accounts are counted towards financial inclusion, they are not financial institutions as such. They are only electronic money issuers (EMIs). Thus the contribution of MoMo toward financial inclusion will be analysed as an addition to having an account at a financial institution.

The chapter begins with an overview of the financial inclusion performance of Ghana. After analysing the demographic characteristics of the respondents, the rest of the chapter specifically assesses the extent to which MoMo is influencing the use of

[4] Refer to https://www.graphic.com.gh/business/business-news/mobile-money-outstrips-cheques-in-non-cash-retail-payments.html for details.

accounts (with emphasis on formal accounts), access to savings and access to credit as measures of financial inclusion.

5.2 Financial Inclusion in Ghana

Evidence is presented from the three rounds of the World Bank's Global financial inclusion survey on the performance of Ghana vis-a-vis that of Sub-Saharan Africa from 2011 to 2017 (see Appendix 3). Using ownership of account as a measure of financial inclusion, the results show that between 2011 and 2014, even though there was an 11.1 percentage points increase in the proportion of Ghanaians (aged 15 and above) that had accounts, the majority of Ghanaians (59.5%) were still financially excluded. However, as at 2017, the majority of Ghanaians (57.7%) had become financially included.

This performance in 2017 can be attributed largely to the increasing adoption of MoMo over the period. It can be observed that between 2011 and 2017, the proportion of Ghanaians who adopted MoMo in addition to the account they operate at a financial institution increased by 21.4 percentage points (Figure 5.1). This means that MoMo has been providing additional financial service to an increasing number of Ghanaians who were already financially included. Within the same period, the results further show that those who had no account at a financial institution and use only MoMo increased from 0.3% in 2011 (two years into its inception) to as high as 15.4% in 2017. This means that between 2011 and 2017, MoMo directly increased the extent of Ghana's financial inclusion by 15.1 percentage points, and indirectly by facilitating increased utilization of financial institutions in addition to MoMo. The proportion of the population with accounts at financial institutions nearly doubled over the period, from 29.4% to 42.2%.

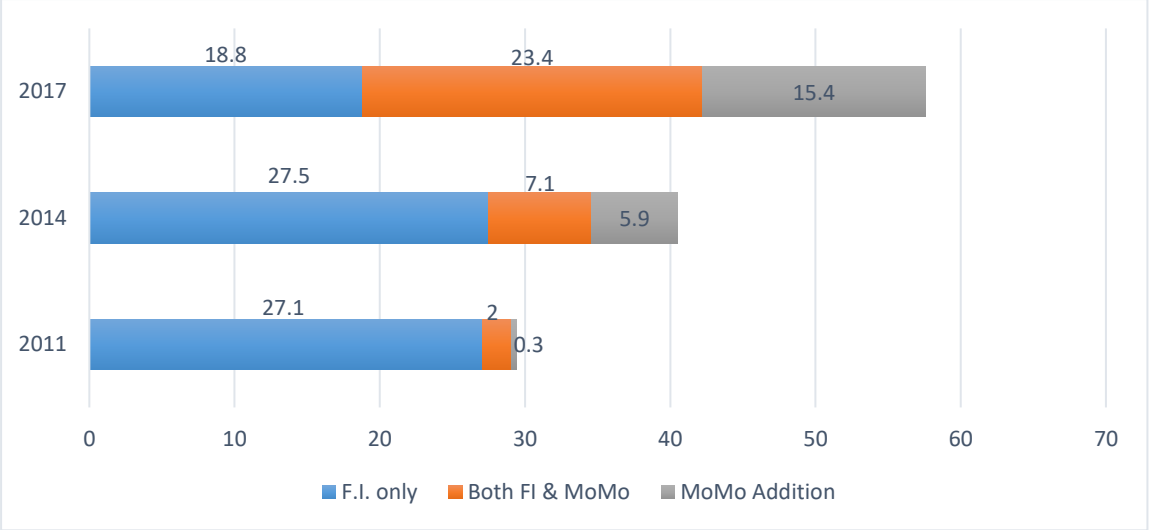

Figure 5. 1: Ghana's Financial Inclusion Performance 2011 – 2017 (%)

Freq.: 1000/year *Source: Findex Survey, 2011 – 2017*

5.3 Demographic Characteristics of Respondents

The results presented in Table 5.1 compare the demographic characteristics of those who are financially included (own accounts) to those who are financially excluded. The gender analysis shows that men were more likely than women to be financially included in 2014, although the difference was not statistically significant (see section 5.3.1). In 2017, the majority of both males and females became financially included as compared to 2014. In 2017, even though the majority of both males and females were financially included, the proportion of males (61.8%) was significantly higher than females (53.7%) by 8.1 percentage points.

The analysis by educational qualification of the respondent shows that there is a significant association between education and financial inclusion. In both years, increasing levels of education significantly increase the chance of becoming financially included. For instance, in 2014, the proportion of Ghanaians who were financially included increased from 28.9% among those with primary education to 50.5% among

those with secondary and further to 89.6% among those with tertiary education. Similarly, in 2017, the proportion of those who were financially included increased from 49.4% among those with primary education to 65.4% among those with secondary education to as high as 97.7% among those with tertiary education. The results further show that the proportion of Ghanaians across the three educational levels who were financially included in 2017 was higher than those who were financially included in 2014.

The results show that in 2014, the majority of people across all the income terciles were financially excluded, but in 2017, the majority of Ghanaians within the middle 20% (61.8%) and top 40% (65%) income terciles became financially included, whilst the majority of those within the bottom 40% income tercile (51.7%) remained financially excluded. The results further show a statistically significant association between income and financial inclusion: ownership of accounts (financial inclusion) significantly increases with increasing levels of income (p-value of Pearson chi-square test = 0.000). In 2014, the proportion of those who were financially included increased from 30% among those in the bottom 40% income tercile to 44.8% among those in the middle 20% income tercile and a little further to 49% among those in the top 40% income tercile. In 2017, the proportion of those who were financially included increased from 48.3% among those in the bottom 40% income tercile to 61.8% among those in the middle 20% income tercile and further to 65% among those in the top 40% income tercile.

Studies have shown that, globally, those within the higher income category and the highly educated are more likely to be financially included (Allen et al., 2012). This is because those who are highly educated and are within the rich income category are able

to provide all the necessary documents needed to open an account as compared to those within the poorest income category.

Table 5. 1: Demographic Characteristics of those who are Financially Included and Excluded (%)

Variables	2014		2017	
	Included	Excluded	Included	Excluded
Gender				
Male	41.7	58.3	61.8	38.2
Female	39.4	60.6	53.7	46.3
Chi-square Test	2.174		10.894**	
Educational Attainment				
Primary or less	28.9	75.1	49.4	50.6
Secondary	50.5	49.5	65.4	34.6
Tertiary	89.6	10.5	97.7	2.3
Chi-square Test	101.918***		69.671***	
Income Terciles				
Bottom 40%	30	70	48.3	51.7
Middle 20%	44.8	55.2	61.8	38.2
Top 40%	49	51	65	35
Chi-square Test	26.615***		31.037***	
Age	33	32	32	31
T-test	*Pr(|T| > |t|) = 0.606*		*Pr(|T| > |t|) = 0.490*	
Obs.	421	623	579	377
Percent	42	62	58	38

*** p<0.01, ** p<0.05, * p<0.1

Source: Findex Survey, 2014 and 2017

5.4 Use of Accounts

The first basic measure of financial inclusion is the ownership of accounts. The Findex survey collected data on the ownership of two major types of accounts: account at a financial institution and a MoMo account. Since ownership of various accounts over time has already been discussed in section 5.1, this section disaggregates the results by

the demographic characteristics of the respondents to assess if any significant variations exist across time. It also looks at the factors influencing the choice of an account and the effect of MoMo on the use of accounts.

5.4.1 Type of Accounts Used across Gender

The proportion of males and females using accounts increased between 2014 and 2017 as shown in Figure 5.2. Among the males, the proportion using accounts increased from 41.7% in 2014 to 61.8% in 2017. The proportion of females using accounts also increased from 39.4% in 2014 to 53.7% in 2017.

The results further show that in 2014, there was no significant gender difference in the use of accounts (p-value = 0.384). Thus, the proportion of males using various types of accounts was not significantly different from the proportion of females using the same accounts in 2014. In the same year, across both gender groups, the majority of them were not using any account (58.3% males and 60.6% females). However, in 2017, a significant gender difference was observed in the usage of various types of accounts. The proportion of males operating an account at a financial institution and at the same time using MoMo was 7.8 percentage points higher than the proportion of females using the same type of account. In the same vein, the proportion of males using only MoMo was slightly higher than the proportion of females by 1.3 percentage points.

This result confirms many other studies (such as Fanta and Mutsonziw, 2016; Demirgüç-Kunt et al., 2015; Henderson et al., 2015; Presbitero et al., 2014) that have found a gender gap in terms of account ownership. Thus, the gender disparity in account ownership is not peculiar to Ghana, and is found in countries such as Botswana, Swaziland, and Mauritius where account penetration is higher among men (Fanta &

Mutsonziw, 2016). Studies have shown that women are more likely to be financially excluded compared to men because of lack of documentation to open an account, lower levels of financial literacy, and lack of business expertise, among other rigidities within the formal financial system (Fungácová & Weill, 2015; Kostov et al, 2015; Demirgüc-Kunt et al., 2013).

The results show that between 2014 and 2017, there was a significant increase in the proportion of males and females who were financially included, by 20.1 and 14.3 percentage points, respectively (Figure 5.2). Within the same period, the proportion of males and females using only MoMo accounts increased by 9.2 and 10 percentage points respectively. Similarly, within both periods, the proportion of males and females using both MoMo and financial institution accounts increased by 20.9 and 11.9 percentage points respectively.

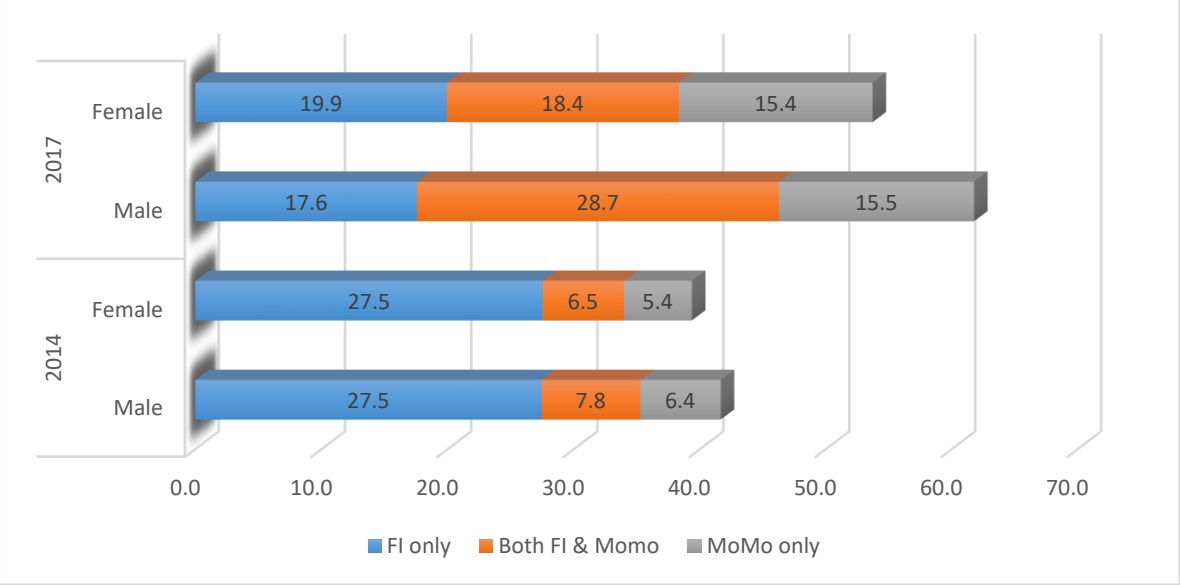

Figure 5. 2: Type of Accounts Used across Gender (%)

Account: Male: 2014 (44.3%), 2017 (66.7%); chi2(1) = 55.22, Pr = 0.0.000
Female: 2014 (39.7%), 2017 (56.4%); chi2(1) = 25.39, Pr = 0.0.000
2014 – Male (41.7%), Female (39.4%); chi2(1) = 2.17, Pr = 0.140
2017 – Male (61.8%), Female (53.7%); chi2(1) = 10.89, Pr = 0.001

Type: 2014: Pearson chi2(3) = 3.05, Pr = 0.384
2017: Pearson chi2(3) = 15.86, Pr = 0.001

Source: Findex Survey, 2014 and 2017

5.4.2 Type of Account across Educational Level

In both 2014 and 2017, the results show that the use of account varies significantly by the level of educational attainment (Figure 5.3). The use of an account rises significantly with increasing levels of education. For instance, in 2014, only 24.9% of those with primary or less education used an account. This proportion rises to 50.5% among those with secondary education and to 89.6% among those with tertiary education. This difference is statistically significant at 1% (p-value = 0.000). In 2017, the use of an account increased significantly across all the three educational levels as compared to 2014. Notwithstanding that, the pattern in the use of an account was similar to that of 2014 where the use of an account increased with increasing levels of education. The proportion using an account was 49.4% for those with primary or less education, less than 65.4% among those with secondary education; those with tertiary education were highest at 97.7%. These differences are statistically significant at 1% (p-value = 0.000).

The results further show that between 2014 and 2017, the use of both an account at a financial institution and MoMo account increased by 16.4 percentage points among those with primary or less education, by 17.9 percentage points among those with secondary education and by 24.4 percentage points among those with tertiary education. Within the same period, the proportion of people who used only a MoMo account increased by 10 percentage points among those with primary or less education, by 10.3 percentage points among those with secondary education and by only 1.9 percentage points among those with tertiary education. Based on this comparative assessment, it can be concluded that for the less educated (those with primary or less education), the increase in financial inclusion came mainly through MoMo, whilst for the highly educated (those with tertiary education), it came through the use of both accounts.

The findings of this study support earlier studies conducted in other parts of the world such as China (Fungácová & Weill, 2015), Argentina (Tuesta, et al., 2015), India (Chithra & Selvam, 2013) and Peru (Camara & Tuesta, 2015). All these studies found that the higher a person's education, the more likely it is for that person to be financially included. Those with higher education are more likely to operate accounts at a financial institution, mainly because they have high financial literacy and can provide the documentation needed to open and operate a financial institution account.

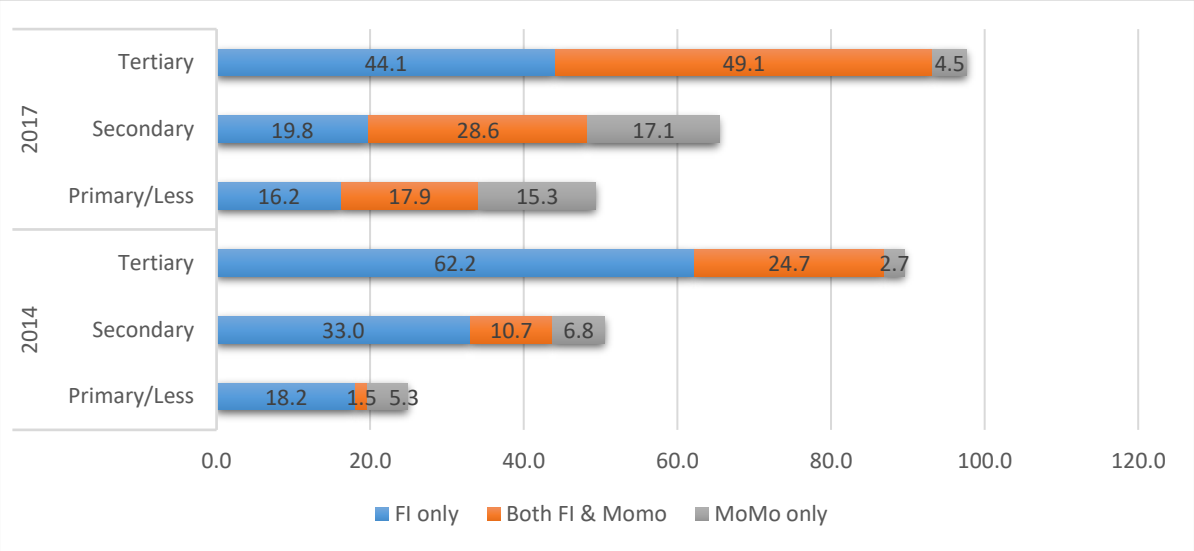

Figure 5. 3: Type of Account across Educational Level (%)

Account: Primary – 2014 (26.5%), 2017 (49.8%); chi2(1) = 49.31, Pr = 0.000
Secondary – 2014 (49.7%), 2017 (70.7%); chi2(1) = 47.20, Pr = 0.000
Tertiary – 2014 (90.2%), 2017 (96.3%); chi2(1) = 1.57, Pr = 0.000
2014 – Primary (24.9%), Secondary (50.5%), Tertiary (89.6%); chi2(2) = 101.92, Pr = 0.000
2017 – Primary (49.4%), Secondary (65.4%), Tertiary (97.7%); chi2(2) = 69.67, Pr = 0.000
Type: 2014: Pearson chi2(6) = 124.40, Pr = 0.000
2017: Pearson chi2(6) = 95.67, Pr = 0.000
Source: Findex Survey, 2014 and 2017

5.4.3 Type of Account across Income Terciles

In both 2014 and 2017, the use of accounts was found to vary significantly across income terciles (Figure 5.4). In 2014 for instance, even though the majority of Ghanaians across the income terciles were financially excluded, the proportion of exclusion was much lower among the top 40% (51%) as compared to the middle 20%

(55.2%) and bottom 40% (70%). In 2017, apart from those within the bottom 40% income tercile, the majority of those within the middle 20% and top 40% income terciles became financially included. The rate of inclusion rises with increasing levels of income. For instance, the proportion of those who were financially included (i.e. used account) was 48.3% among those within the bottom 40% income tercile, 61.8% among those within the middle 20% income tercile, and those within the top 40% income tercile were slightly higher at 65%. These differences are statistically significantly at 1% (p-value = 0.000).

In terms of account usage, it was observed that in both 2014 and 2017, the proportion of Ghanaians using different types of accounts significantly varied across income terciles (p-value = 0.000). The proportion of Ghanaians in the bottom 40% using both an account at a financial institution and MoMo increased 14.6 percentage points. Usage of both accounts also increased by 14.8 percentage points among those in the middle 20% and by 18.9% among those in the top 40% income tercile. On the other hand, usage of only a MoMo account increased by 9.4 percentage points among those within the bottom 40%, by 13.6 percentage points among those within the middle 20 percentage points, but only by 7.6 percentage points among those within the top income tercile. This shows that for the poor (those within the bottom 40% income tercile), the increase in financial inclusion came mainly through MoMo, whilst for the rich (those with the top 40% income tercile), it came through the use of both accounts.

Fungácová and Weill (2015) explain that bank-specific factors such as the high cost associated with opening and operating a bank account sometimes deters people within the low-income category from participating in the formal financial system. This may explain the relative importance of MoMo adoption among those within the bottom 40% income tercile. Those within the middle and top rich income categories have what it

takes to obtain and operate a bank account, whilst at the same time adopting MoMo to enjoy convenient financial services.

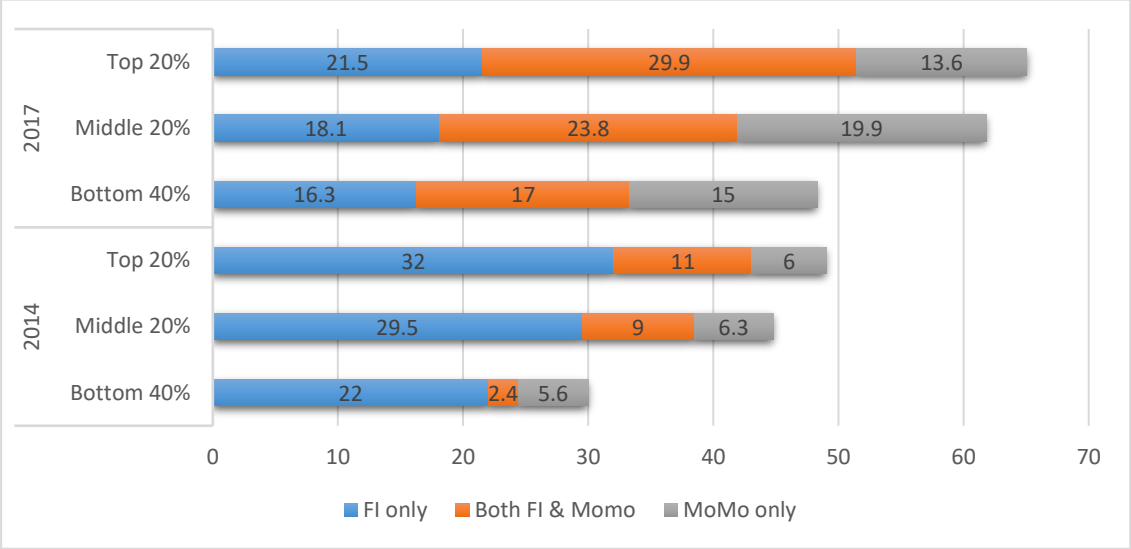

Figure 5. 4: Type of Accounts across Income Tercile (%)

Account: Bottom 40% - 2014 (30.8%), 2017 (50.9%); chi2(1) = 28.25, Pr = 0.000
Middle 20% - 2014 (46.2%), 2017 (64.3%); chi2(1) = 11.78, Pr = 0.001
Top 40% - 2014 (48.4%), 2017 (69.8%); chi2(1) = 45.32, Pr = 0.000
2014 – Bottom 40% (30%), Middle (44.8%), Top (49%); chi2(2) = 26.61, Pr = 0.000
2017 – Bottom 40% (48.3%), Middle (61.8%), Top (65%); chi2(2) = 31.04, Pr = 0.000
Type: 2014: Pearson chi2(6) = 38.01, Pr = 0.000
2017: Pearson chi2(6) = 44.16, Pr = 0.000

Source: Findex Survey, 2014 and 2017

5.4.4 Factors Influencing Account Choice

The account column in Table 5.2 presents probit results showing the predictors of financial inclusion (ownership of account) in 2014 and 2017. The results show that in both years, the predictors of financial inclusion were age, education and income. There was no gender effect in 2014. However, a significant gender effect emerges in 2017. The probability of a female holding an account was 8% less than their male counterparts. There was a significant concave relationship between age and the probability of holding an account in both years. Thus, the chances of people holding account increases as they grow from youth to adulthood but beyond a certain age, the probability begins to old. Thus, old people are less likely to operate an account as

compared to younger people because the relevance of operating an account decreases as people age.

In 2014, the probability of Ghanaians with a secondary education to hold an account was 25.1% higher than those with primary or less education. In the same year, the probability for those with tertiary education to hold an account was 62.2% higher than for those with primary education. Similarly, in 2017, the probability of those with a secondary education to hold an account was 18.8% higher than for those with primary or less education. And the probability of those with tertiary education to hold an account was 43.8% higher than for those with primary education. The results further show that in 2014, the probability of those within the middle 20% and top 40% income tercile to hold an account was 11.3% and 12.2% higher than for those within the bottom 40% income tercile, respectively. In 2017, the probability of either those within the middle 20% and top 40% to hold an account was 10.5% and 10.2% higher than for those within the bottom 40% income tercile, respectively. These factors are consistent with the findings of earlier studies (Cámara & Tuesta, 2015; Burhouse & Osaki, 2012; Honohan & King, 2012; Beck et al., 2011).

A bivariate probit analysis was further conducted to assess the factors that influence the choice of account and whether they vary over time. For those who held both an account at a financial institution and a MoMo account in 2014, the significant predictors were age, education and income. In 2017, in addition to age, education and income, sex of the respondent emerged as a significant determinant of holding both accounts. Whilst age had a concave relationship with the probability of holding both accounts in both years, the probability of someone holding both an account at a financial institution and a MoMo account increases with increasing level of education in both years. For instance, in 2014, the probability of those with secondary education to hold both

accounts was 6.8% higher than of those with primary or less education. For those with tertiary education, the probability to hold both accounts was 20.1% higher than of those with primary or less education. In the same vein, in 2017, the probability of those with secondary and tertiary education to hold both accounts was 10.8% and 38.2% higher than of those with primary or less education respectively.

For those who have only a MoMo account, in both years, the common factor that influenced adoption was education. The probability of those with tertiary education to have only a MoMo account was 2.8% and 13.1% lower than of those with primary or less education in 2014 and 2017 respectively. There was no income effect on the probability of a person to have only a MoMo account in both years.

The predictors of financial exclusion (i.e. using no account) in 2014 were age, education and income. In addition to these factors, gender was also a significant predictor of financial exclusion in 2017. Thus, whilst gender was not a significant determinant of financial exclusion in 2014, in 2017, the probability of females to become financially excluded was 9.4% higher than of the males. Age had a significant convex effect on the chances of someone becoming financially excluded in both years. Thus, the need for account to make transfers, save and obtain credit increases as people age from youth to adulthood but at older age, the need and use of account diminishes.

The probability of those with secondary and tertiary education becoming financially excluded was 26.1% and 61.5% less, respectively, than those with primary or less education in 2014. In the same vein, in 2017, the probability of those with secondary and tertiary education becoming financially excluded was 14% and 41.9% less, respectively, than of those with primary or less education. Income also had a similar effect of financial exclusion as education, where those within the middle 20% and top

40% income tercile were less likely to become financially excluded as compared to those within the bottom 40% income tercile in both years. This, therefore, shows that the higher a person's education and income status, the less likely that person is to be financially excluded. These findings are all consistent with many recent studies (such as Fanta & Mutsonziw, 2016; Demirgüç-Kunt et al., 2015; Henderson et al., 2015; Honohan & King, 2012).

Table 5. 2: Factors Influencing Account Choice

Variables	2014					2017				
	Account	**FI Only**	**FI and MoMo**	**MoMo Only**	**None**	**Account**	**FI Only**	**FI and MoMo**	**MoMo Only**	**None**
Female	0.006	0.021	-0.004	-0.009	-0.007	-0.080***	0.011	-0.077***	-0.028	0.094***
	(0.033)	(0.028)	(0.012)	(0.012)	(0.030)	(0.030)	(0.023)	(0.026)	(0.021)	(0.032)
Age	0.012**	0.013**	0.004	-0.001	-0.015***	0.013***	0.005	0.012***	-0.002	-0.015***
	(0.005)	(0.005)	(0.003)	(0.003)	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Age^2	-0.000*	-0.000	-0.000	-0.000	0.000**	-0.000***	-0.000	-0.000***	0.000	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Educational Attainment (ref: Primary/less)										
Secondary	0.251***	0.174***	0.068***	0.018	-0.261***	0.188***	0.032	0.108***	-0.001	-0.140***
	(0.035)	(0.030)	(0.012)	(0.014)	(0.032)	(0.033)	(0.024)	(0.027)	(0.023)	(0.035)
Tertiary	0.622***	0.442***	0.201***	-0.028*	-0.615***	0.438***	0.168*	0.382***	-0.131***	-0.419***
	(0.057)	(0.076)	(0.061)	(0.017)	(0.052)	(0.043)	(0.087)	(0.081)	(0.026)	(0.040)
Income Tercile (ref: Bottom 40%)										
Middle 20%	0.113**	0.068*	0.041**	0.017	-0.127***	0.105**	-0.011	0.073**	0.032	-0.093**
	(0.047)	(0.040)	(0.017)	(0.017)	(0.043)	(0.044)	(0.031)	(0.037)	(0.033)	(0.045)
Top 40%	0.122***	0.074**	0.046***	0.019	-0.139***	0.102***	0.039	0.071**	-0.015	-0.095**
	(0.037)	(0.032)	(0.013)	(0.015)	(0.034)	(0.035)	(0.026)	(0.029)	(0.023)	(0.037)
Obs.	992					957				

Note: FI means account(s) at a financial institution

Estimated marginal effects are presented and robust standard errors are in parentheses.

Standard errors are robust to heteroscedasticity

*** p<0.01, ** p<0.05, * p<0.1

Source: Findex Survey, 2014 and 2017

5.4.5 Effect of MoMo on operating accounts at a financial Institution

Table 5.3 presents the results of a recursive bi-variate probit regression analysis showing the probability that having a MoMo account influences people to have an account at a formal financial institution. In both 2014 and 2017, the results show that, controlling for the demographic characteristics of an individual, having a MoMo account significantly increases the chance of opening an account at a financial institution. However, this effect diminishes somewhat over time: between 2014 and 2017, controlling for the demographic characteristics of an individual, the probability of a MoMo user having an account at a financial institution reduced from 55.1% to 46%. This shows that MoMo serves as a gateway for people to open an account with a financial institution, and this will enable them to access formal financial services.

Table 5. 3: Effect of MoMo on Operating Accounts at a Financial Institution

	2014	2017
Female	0.021	0.007
	(0.027)	(0.028)
Age	0.013***	0.006
	(0.004)	(0.004)
Age^2	-0.000**	-0.000
	(0.000)	(0.000)
Educational Attainment (ref: Primary or Less)		
Secondary Education	0.146***	0.041
	(0.032)	(0.036)
Tertiary Education	0.400***	0.305***
	(0.083)	(0.117)
Income Quintiles (ref: Bottom 40%)		
Middle 20%	0.060	-0.007
	(0.038)	(0.037)
Top 40%	0.065**	0.047
	(0.031)	(0.033)
Momo Account	0.551***	0.460***
	(0.042)	(0.030)
Obs.	992	957
Prob>chi2	0.000	0.000

Estimated marginal effects are presented and robust standard errors are in parentheses.
Standard errors are robust to heteroscedasticity
*** p<0.01, ** p<0.05, * p<0.1
Source: Findex Survey, 2014 and 2017

5.5 Savings

The second indicator of financial inclusion is savings. The hypothesis is that MoMo serves as a gateway for people to save, and that they may go on to save at a financial institution as well as in their MoMo wallet.

5.5.1 Forms of Savings

The results presented in Figure 5.5 show that in both years, even though the majority of Ghanaians save, the proportion reduced from 55.3% in 2014 to 50.2% in 2017. In

2014, of the 55.3% of Ghanaians who saved, a large proportion of them saved through informal means (27.6%). However, in 2017, of the 50.2% Ghanaians who saved, a large proportion of them saved only in the MoMo wallet (22.1%). In 2017, the proportion of Ghanaians who saved only in their MoMo wallet was 17 percentage points higher than those who saved only at a financial institution, 10.2 percentage points higher than those who saved at both financial institution and in their MoMo wallet and 11.1 percentage points higher than those who saved through informal means. This, therefore, means that the MoMo wallet provides the unbanked segment with a convenient financial tool to boost their savings. Looking at the proportion of Ghanaians who saved only through their MoMo wallet in 2014 (6.4%) and 2017 (22.1%), people clearly are gaining confidence in MoMo as a secure tool for savings. This finding supports many empirical works that have found that the adoption of MoMo induces saving among both the previously excluded segment of the population, as well as the richer households (Batista & Vicente, 2016; Jack & Suri, 2014, 2011; Mbithi & Weil, 2014; Honohan & King, 2012; Shem et al., 2012; Wilson et al., 2010; Collins et al., 2009; Comninos et al., 2009). Studies have shown that MoMo induces saving among the poor and the previously excluded segment of the population because it is compatible with their way of life and offers them an opportunity to save even in small quantities at their own convenience (Ouma et al., 2017).

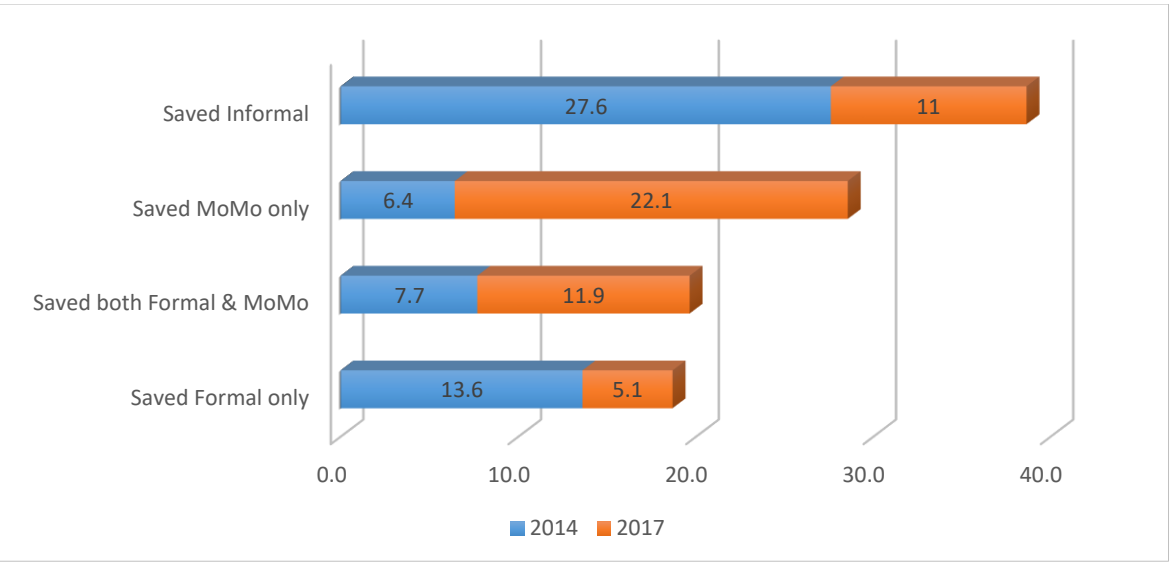

Figure 5. 5: Forms of Savings (%)

Saved: 2014 = 55.3% 2017 = 50.2%
Source: Findex Survey, 2014 and 2017

5.5.2 Forms of Savings across Gender

In Figure 5.6, the results show that in both 2014 and 2017, the proportion of males who saved was slightly higher than their female counterparts. Whilst in 2014, the gender difference of 4.5 percentage points was not statistically significant; in 2017, the gender difference of 7.3 percentage points was statistically significant at 5% (p-value=0.028). The gender difference in savings confirms the results from earlier studies (by scholars such as Mukhongo, 2014; Mukindia, 2012; Njunge, 2013; Lihiku, 2006; Aryeetey, 2004). Some scholars have explained that women's low saving rate is as a result of their conservative and risk-averse nature (Mulino & Chai, 2008). The human capital theory explains that women tend to save less mainly because they invest less in enterprises and in activities that can enhance their human capital such as education and skills accumulation. This has a negative ripple effect on their wealth creation and hence their relatively low savings as compared to their male counterparts (Becker, 1975). There is a growing literature that has found that women spend much of their income on

household provisioning and meeting children nutrition compared to men rather than saving to (re)invest in business (Quisumbing & Maluccio, 1999; Handa, 1994; Cutler & Katz, 1991).

The results further show that in terms of forms of savings, in 2014, a large proportion of both males and females used informal means to save. For instance, of the 57.6% males who saved, more than half of them (28.6%) saved through informal means; likewise, of the 53.1% females who saved, more than half of them (27%) saved using informal means. However, in 2017, the proportion of both males and females who saved their income in their MoMo wallet greatly surpassed informal savings. For instance, of the 53.9% males who saved, as high as 24.9% of them kept their savings in their MoMo wallet only, as against only 10.8% using informal means. Similarly, of the 46.6% females who saved, 19.4% saved in their MoMo wallet only, as against 11.4% through informal means.

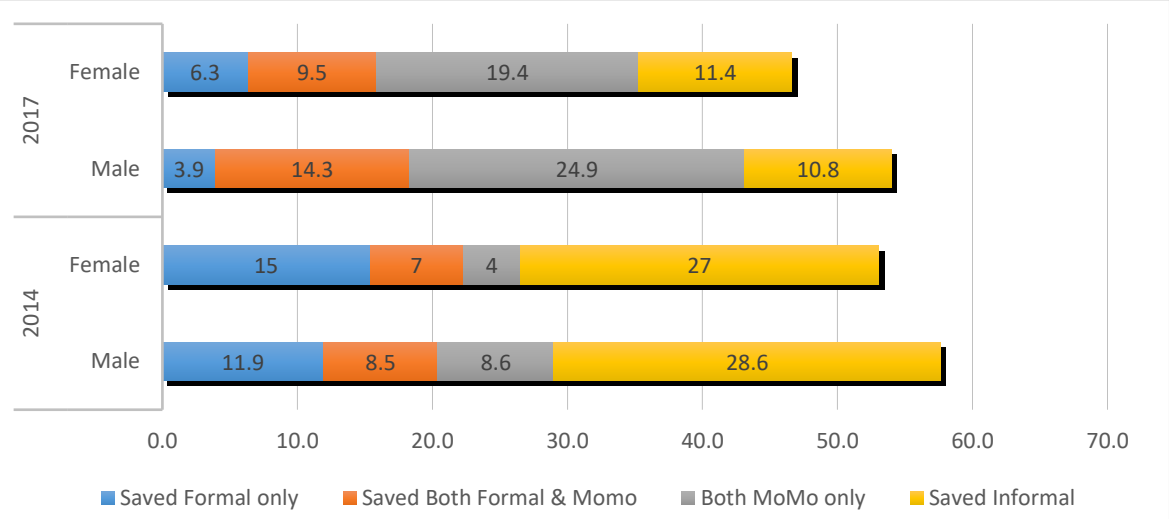

Figure 5. 6: Forms of Savings across Gender (%)

Saved: Male – 2014 (57.4%), 2017 (57.6%); chi2(1) = 0.0034, Pr = 0.954
Female – 2014 (53.9%), 2017 (50.6%); chi2(1) = 0.9640, Pr = 0.326
2014 – Male (57.6%), Female (53.1%); chi2(1) = 1.29, Pr = 0.256
2017 – Male (53.9%); Female (46.6%); chi2(1) = 4.85, Pr = 0.028
Forms: 2014 - chi2(3) = 8.11, Pr = 0.044

2017 - chi2(3) = 5.56, Pr = 0.135

Source: Findex Survey, 2014 and 2017

5.5.3 Forms of Savings by Educational Qualification

The results presented in Figure 5.7 show that in both 2014 and 2017, the proportion of Ghanaians who save significantly rises with the level of education. In 2014, for instance, the proportion of Ghanaians with tertiary education who saved was 38.9 and 28.6 percentage points higher than those who had only primary or less education and secondary education respectively. Similarly, in 2017, the proportion of Ghanaians with tertiary education who saved was 17.5 and 10.2 percentage points higher than those who had only primary or less education and secondary education respectively. Thus, as a person's level of educational attainment increases, the probability that the person saves also increases. This result confirms the findings of recent works by scholars such as Demirgüç-Kunt et al. (2018), Mukhongo (2014), Demombynes and Thegeya (2012), Mukindia (2012), Njunge (2013) and Lihiku (2006), who all found savings attitude to be high among people with higher education as compared to people with less education.

In terms of the forms of savings, the results further show that in 2014, a large proportion of Ghanaians across the three educational levels saved through informal means. Of the 48.7% Ghanaians with primary or less education who saved, as high as 30.9% of them saved through informal means. Similarly, of the 59% of the respondents with secondary education who were financially included, 24.9% represented saved through informal means, whilst 40.6% of the 87.6% of Ghanaians with tertiary education who were financially included also saved through informal means. In 2017, a large proportion of Ghanaians with primary or less education (20.4%) and secondary education (24.9%) saved in their MoMo wallets only. For those with tertiary education, some of them

saved in both formal accounts and in MoMo wallets (23%) whilst others saved in their MoMo wallet only (22.2%) as shown in Figure 5.7.

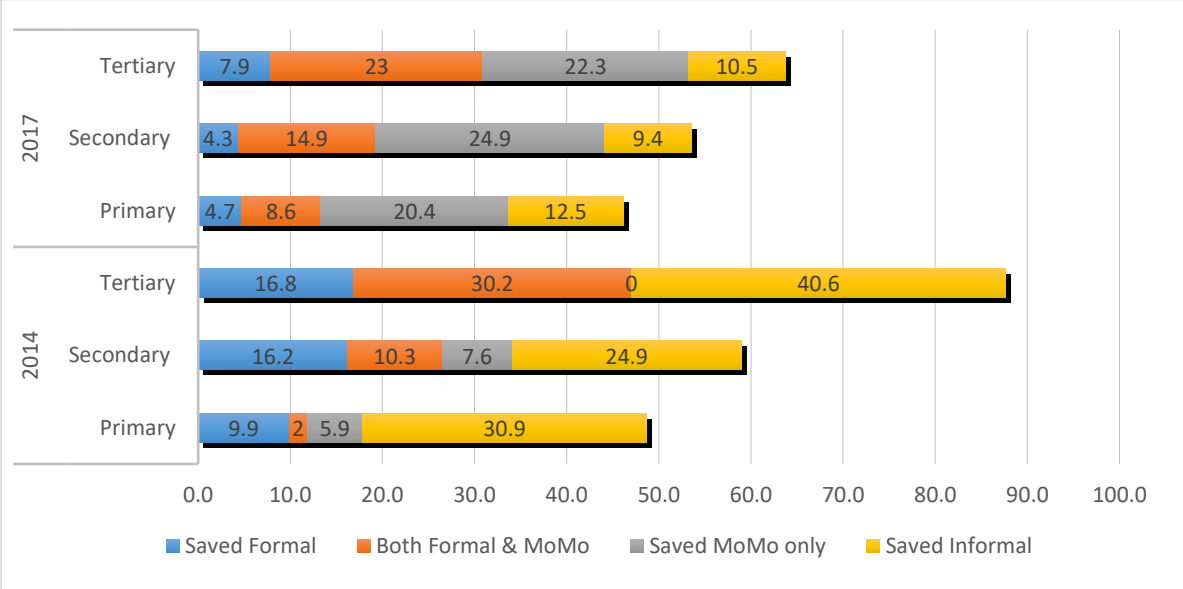

Figure 5. 7: Forms of Savings across Education (%)

Saved: Primary – 2014 (49.5%), 2017 (46.6%); chi2(1) = 0.9640, Pr = 0.326
Secondary – 2014 (58.3%), 2017 (60.1%); chi2(1) = 0.3325, Pr = 0.564
Tertiary – 2014 (82.4%), 2017 (70.4%); chi2(1) = 2.0760, Pr = 0.150
2014 – Primary (48.7%), Secondary (59%), Tertiary (87.6%); chi2(2) = 22.51, Pr = 0.000
2017 - Primary (46.2%), Secondary (53.5%), Tertiary (63.7%); chi2(2) = 22.13, Pr = 0.000
Forms: 2014 - chi2(6) = 37.56, Pr = 0.000
2017 - chi2(6) = 19.89, Pr = 0.003
Source: Findex Survey, 2014 and 2017

5.5.4 Savings Across Income Terciles

For financial inclusion purposes, the emphasis of this section is on the poorest 40%, most of whom are usually excluded from the financial system. As expected, the proportion of people within the middle 20% and richest 40% who save was higher than those within the poorest 40% in both 2014 and 2017. For instance, in 2014, the proportion of those within the top 40% income tercile who saved was 14.1 and 4.4 percentage points higher than those within the bottom 40% and middle 20% income terciles, respectively. Similarly, in 2017, the proportion of those within the top 40%

income tercile who saved was 9.4 percentage points higher than those within the bottom 40%. However, in 2017, the proportion of those within the middle 20% who saved was slightly (1.4%) higher than those within the top 40% income tercile. This result is similar to the findings of Fungácová and Weill (2015) and Allen et al. (2012), who found that those within the higher income category are more likely to have savings, usually in formal financial institutions, as compared to those within the low-income category.

In terms of the forms of savings, the results presented in Figure 5.8 show that in 2014, a large proportion of Ghanaians across the three income terciles saved through informal means, but in 2017, a large proportion of Ghanaians saved in their MoMo wallet only, even among the top 40% income tercile. In 2014, of the 47.8% of Ghanaians within the bottom 40% income tercile who saved, as high as 29.4% saved using informal means. Among the middle 20% and top 40%, it was 24% and 28.6% respectively. However, in 2017, among the 44.3% Ghanaians within the bottom 40% income tercile who saved, 16.6% saved their income in their MoMo wallet. Among the 55.1% Ghanaians within the middle 20% income tercile who saved, as high as 28.3% saved in their MoMo wallet only. Finally, among the 53.7% Ghanaians within the rich 40% income tercile who saved, 24.2% saved in their MoMo wallet only. This shows that among those who save, the proportion of those within the middle 20% and rich 40% income tercile who save in their MoMo wallet only is relatively higher than those within the poor 40% income tercile.

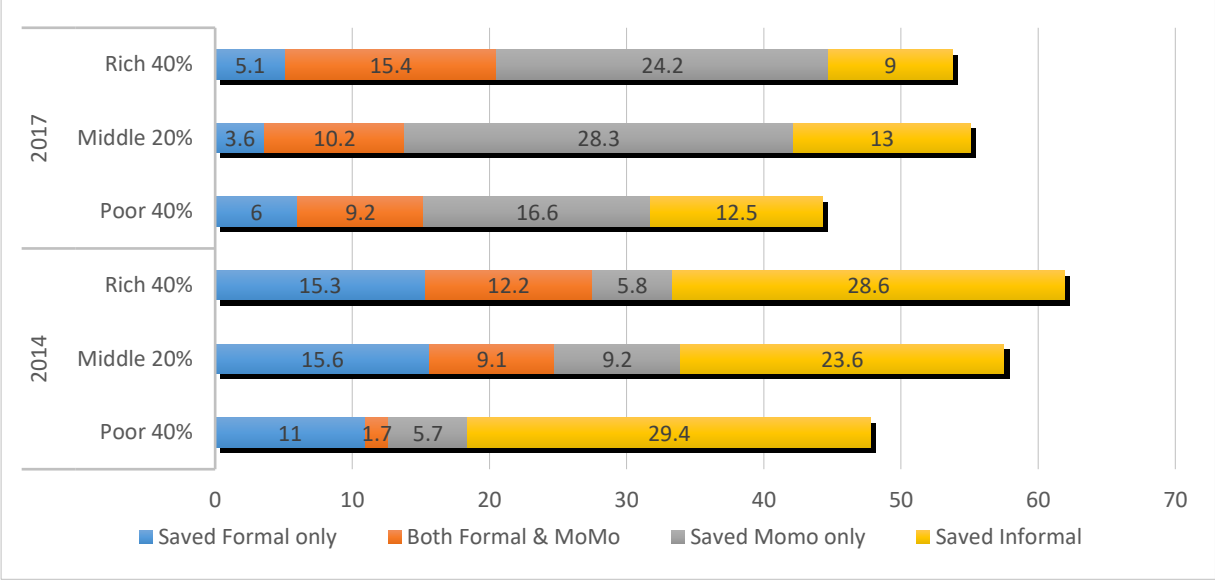

Figure 5. 8: Savings across income Tercile (%)

Saved: Poor 40% - 2014 (47.2%), 2017 (46.5%); chi2(1) = 0.0289, Pr = 0.865
Middle 20% - 2014 (57.1%), 2017 (53.8%); chi2(1) = 0.3823, Pr = 0.536
Top 40% - 2014 (61.2%), 2017 (60.7%); chi2(1) = 0.0259, Pr = 0.872
2014 – Poor 40% (47.8%), Middle 20% (57.5%), Top 40% (61.9%); chi2(2) = 15.86, Pr = 0.000
2017 - Poor 40% (44.3%), Middle 20% (55.1%), Top 40% (53.7%); chi2(2) = 16.29, Pr = 0.000

Forms: 2014 - chi2(6) = 18.43, Pr = 0.005
2017 - chi2(6) = 19.07, Pr = 0.004

Source: Findex Survey, 2014 and 2017

5.5.5 Effect of MoMo on Savings

Table 5.4 presents the results of a recursive bivariate probit model showing the probability that MoMo users: (a) save; (b) save through a formal source; (c) save through informal sources; or (d) save in their MoMo wallet. The results show that, although in 2014 the positive association between having a MoMo account and saving was not statistically significant, in 2017, having a MoMo account was a significant determinant for savings. In 2017, having a MoMo account significantly increased the chance of saving by 48.4%. This finding supports the findings of many other studies that have examined the effect of MoMo on the use of financial services beyond money transfer, with a specific focus on savings. Scholars such as Batista and Vicente (2016),

Jack and Suri (2014), Honohan and King (2012) and Shem et al., (2012) have all found that the adoption of MoMo induces savings behaviour among those who previously had no savings because they had no accounts. Jack and Suri (2014) explain that having savings enables MoMo users who were previously excluded to absorb relatively large income shocks without any significant reduction in their household consumption.

In terms of the forms of savings, the results show that in 2014, controlling for the demographic characteristics of the individual, those with a MoMo account were 44.3% times more likely to save at a financial institution than non-users. However, in 2017, this effect was diminished and not statistically significant (see Table 5.4). Based on the demographic characteristics of those who saved in their MoMo wallet, it can be concluded that in 2014, the MoMo account holders who saved at a financial institution were more likely to be those who already had an account at a financial institution (i.e. those who were already financially included). The results further show that, in both years, controlling for the demographic characteristics of the individual, having a MoMo account did not have any significant effect on the likelihood of an individual to save using informal sources.

In 2014, the determinants of the probability of people to save in their MoMo wallet were gender, education and income. Those with secondary and tertiary education were 6% and 13.1% more likely to save in their MoMo wallet as compared to those with primary or less education, respectively. Also, those within the middle 20% income tercile were 7.1% more likely to save in their MoMo wallet as compared to those within the poor 40% income tercile. Similarly, those within the rich 40% income tercile were 6.7% more likely to save in their MoMo wallet as compared to those within the poor 40% income tercile as shown in Table 5.4.

In 2017, gender, education and income were the significant determinants of the

probability of MoMo users to save in their MoMo wallet only. Females were 9% less likely to save in their MoMo wallet as compared to males. People with secondary and tertiary education were 8.1% and 20.6% more likely to save in their MoMo wallet as compared to those with primary or less education respectively. Those within the middle 20% and rich 40% income terciles were 12.8 and 9.6% more likely to save in their MoMo wallet as compared to those within the poor 40% income tercile respectively (see Table 5.4).

Since saving is a function of income, it is not surprising that the proportion who are saving increases as people's income level rises. Many studies have shown that MoMo adoption induces both the rich and the poor to save some of their income through their MoMo account due to the convenience it offers to transfer money to others at a relatively lower cost (Batista & Vicente, 2016; Jack & Suri, 2014, 2011; Mbithi & Weil, 2014; Honohan & King, 2012; Shem et al., 2012; Wilson et al., 2010; Collins et al., 2009; Comninos et al., 2009).

Table 5. 4: Effect of MoMo on the Various Forms of Savings

	2014				2017			
Variables	**Save**	**Formal Savings**	**Informal Savings**	**Save MoMo**	**Save**	**Formal Savings**	**Informal Savings**	**Save MoMo**
Female	-0.035	0.025	-0.029	-0.034*	0.011	0.009	-0.008	-0.090***
	(0.033)	(0.021)	(0.032)	(0.020)	(0.041)	(0.039)	(0.036)	(0.032)
Age	0.007	0.008**	0.005	0.005	0.003	-0.006	0.004	0.007
	(0.007)	(0.004)	(0.006)	(0.005)	(0.006)	(0.004)	(0.005)	(0.005)
Age^2	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Educational Attainment (ref: Primary/Less)								
Secondary	0.117**	0.085***	-0.011	0.060***	-0.003	0.016	0.014	0.081**
	(0.050)	(0.029)	(0.085)	(0.020)	(0.044)	(0.042)	(0.038)	(0.035)
Tertiary	0.370***	0.143**	0.133	0.131**	-0.055	0.074	-0.032	0.206**
	(0.082)	(0.062)	(0.240)	(0.060)	(0.079)	(0.141)	(0.073)	(0.087)
Income Tercile (ref: Bottom 40%)								
Middle 20%	0.090*	0.025	-0.017	0.071***	0.011	-0.033	0.047	0.128***
	(0.052)	(0.029)	(0.062)	(0.027)	(0.054)	(0.040)	(0.048)	(0.048)
Rich 40%	0.123***	0.059**	0.069	0.067***	0.025	0.030	-0.002	0.096***
	(0.037)	(0.026)	(0.076)	(0.022)	(0.043)	(0.037)	(0.036)	(0.036)
Momo User	-0.306	0.443***	0.080		0.484***	0.310	0.029	
	(1.037)	(0.042)	(0.979)		(0.076)	(0.221)	(0.134)	
Obs.	992	992	992	992	957	918	891	957
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000

Estimated marginal effects are presented and robust standard errors are in parentheses.
Standard errors are robust to heteroscedasticity
*** p<0.01, ** p<0.05, * p<0.1
Source: Findex Survey, 2014 and 2017

5.5.6 Purpose for Savings

The results presented in Figure 5.9 show that in both 2014 and 2017, the main reason why MoMo users save is for business purposes. In 2014, the second most important purpose for savings among MoMo users was to pay for education (30.7%). Education was not part of the options in the 2017 survey. For non-MoMo users, in 2014, their main purposes for saving were to pay for education (28.4%) and to invest in or start a business (23%); whilst in 2017, their main reasons for saving were for business and old age.

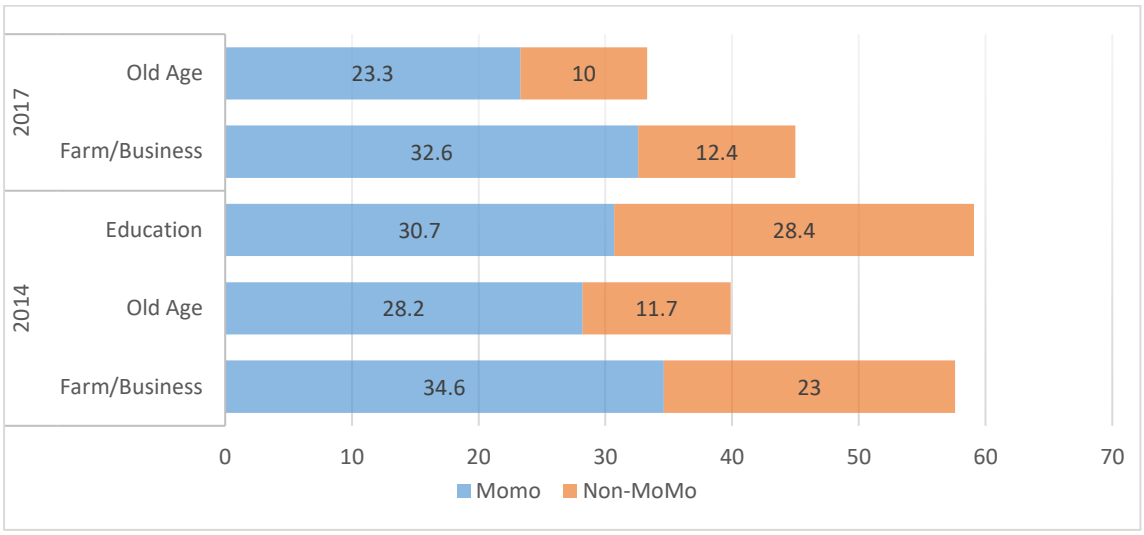

Figure 5. 9 Reason for Saving (%)
Source: Findex Survey, 2014 and 2017

5.6 Credit

The third and final indicator of access to financial services in this study is access to credit, which is an additional financial service capable of aiding the poor and vulnerable to make the necessary investments needed to lift them out of poverty. This section looks at the probability that MoMo users accessed credit, especially from formal sources.

5.6.1 Access to Credit

The results presented in Figure 5.10 show that between 2014 and 2017, there was a significant increase in the proportion of those who accessed credit. In 2017, the proportion of Ghanaians who accessed credit was 3.9 percentage points higher than those who accessed credit in 2014. This difference is statistically significant (p-value = 0.003).

In both years, a large proportion of Ghanaians accessed credit from informal sources (i.e. family and friends, clubs and other informal money lenders) as compared to formal

sources. For instance, in 2014, of the 36.4% Ghanaians who accessed credit, as high as 31.9% of them accessed credit from informal sources and only 4.5% accessed credit from formal sources. In the same vein, in 2017, of the 40.3% Ghanaians who accessed credit, as high as 33.7% of them accessed credit from informal sources and only 6.6% accessed credit from formal sources.

As in other developing countries, Ghanaians are much more likely to obtain credit from informal sources (i.e., family and friends, clubs and other informal money lenders) than from formal sources. This is mainly because formal financial institutions are always reluctant to extend credit facility to poor households, as well as to people operating micro and small businesses, mainly for lack of documentation and because they are perceived to be risky borrowers with greater uncertainty for repayment (Abor, 2008; Beck & Demirguc-Kunt 2006; Ofei, 2004; Bigsten et al, 2003; Kimuyu & Omiti 2000; Aryeetey & Udry, 1997). This therefore forces many people to borrow from informal sources at high interest rates (Bigsten et al., 2003; Steel & Andah, 2003; Atieno, 2001).

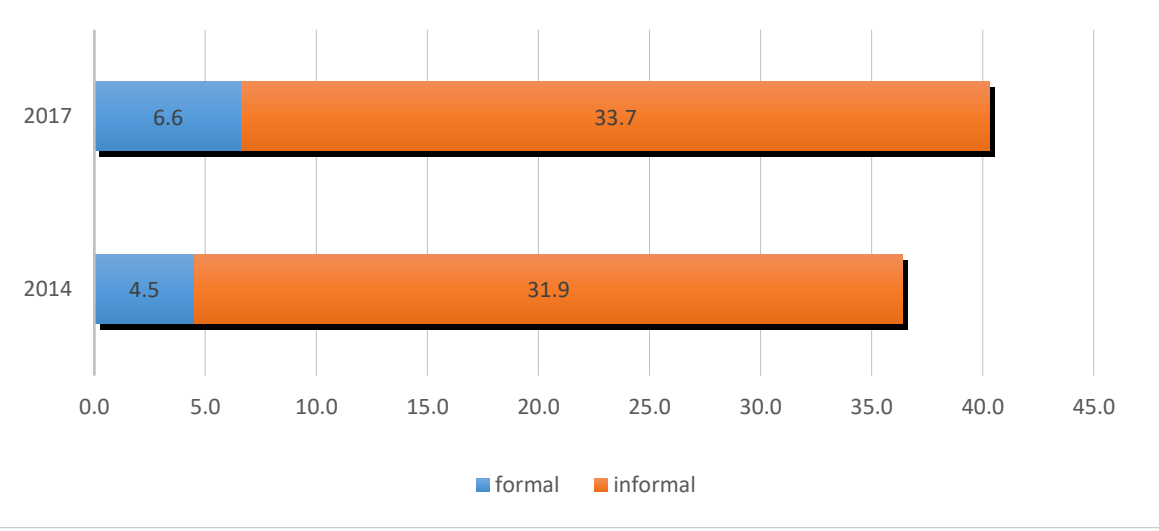

Figure 5. 10: Access to Credit (%)

Accessed credit: 2014 = 36.4%, 2017 = 40.3%; chi2(1)= 8.83, Pr = 0.003
Source: Findex Survey, 2014 and 2017

5.6.2 Access to Credit across Account Holders

The results presented in Figure 5.11 show that between 2014 and 2017, even though there was an increase in the proportion of Ghanaians who saved, they saved mainly through informal means. Across all the three different account holders, it was only those who held both accounts at financial institutions and a MoMo account that there was a marginal 2.6 percentage points increase in the proportion who accessed credit from formal sources between 2014 and 2017. The proportion of Ghanaians who hold only a MoMo account and who accessed credit from formal means (0.6%) was the same in both 2014 and 2017.

However, in 2017, the proportions of those who had both MoMo accounts and financial institution accounts (39%), as well as those who used only a MoMo account (35%), who accessed credit from informal sources were significantly higher than for their counterparts who owned only a financial institution account or had no account at all. Between 2014 and 2017, the proportion of Ghanaians holding both a financial institution and a MoMo account who accessed credit from informal sources increased by 13.7 percentage points. Within the same period, the proportion of only MoMo account holders who accessed credit from informal sources also increased by 9.5 percentage points. This suggests that increasing access to MoMo may be associated with increasing use of credit from informal sources. As of 2017, the float one holds in a MoMo wallet cannot serve as a basis for accessing credit from formal sources. Access to credit from formal sources requires, among other things, a good financial history and other collaterals and securities.

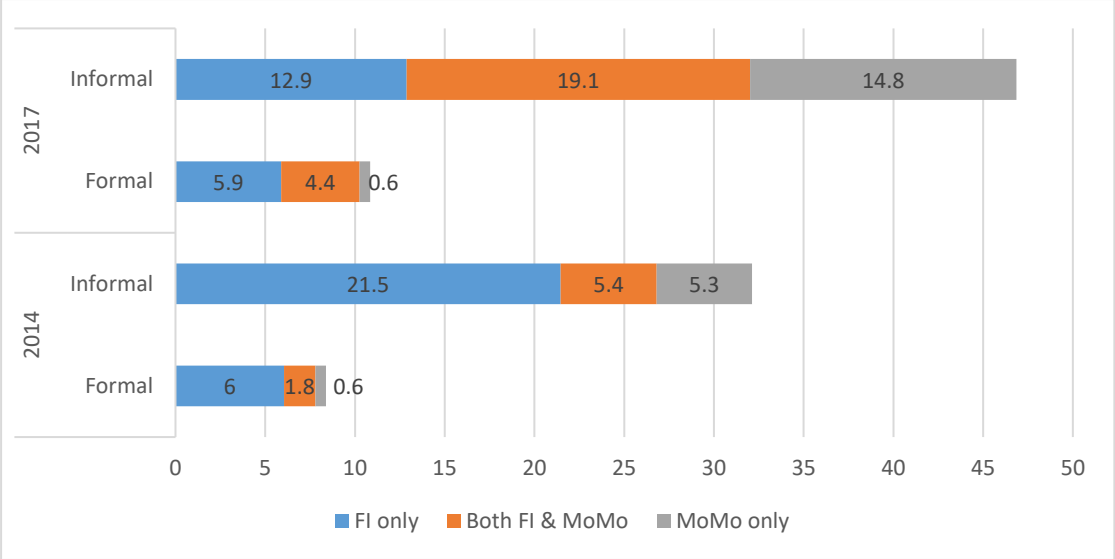

Figure 5. 11: Access to Credit across Different Account Holders (%)

2014 – FI (27.5%), Both (7.1%), MoMo only (5.9%)
2017 – FI (18.8%), Both (23.5%), MoMo only (15.4%)
Source: Findex Survey, 2014 and 2017

5.6.3 Access to Credit across Gender

In both years, the results presented in Figure 5.12 show that the proportion of males that accessed credit was relatively higher than their female counterparts. The proportion of males who accessed credit was 2.7 and 5.4 percentage points higher than the females in 2014 and 2017, respectively. In both years, both gender groups accessed credit, more from informal sources compared to formal sources. The proportion of males who accessed credit from informal sources was higher than the females in both years.

This result supports the findings from previous studies that found that women tend to be less favoured than men when accessing loans (Henderson et al., 2015; Demirgüç-Kunt et al., 2015; Beck et al., 2011). This is because women tend to lack the collateral and documentation needed to access loans (Fanta & Mutsonziw, 2016), as well as having poor financial literacy and low business expertise (Lotto, 2018).

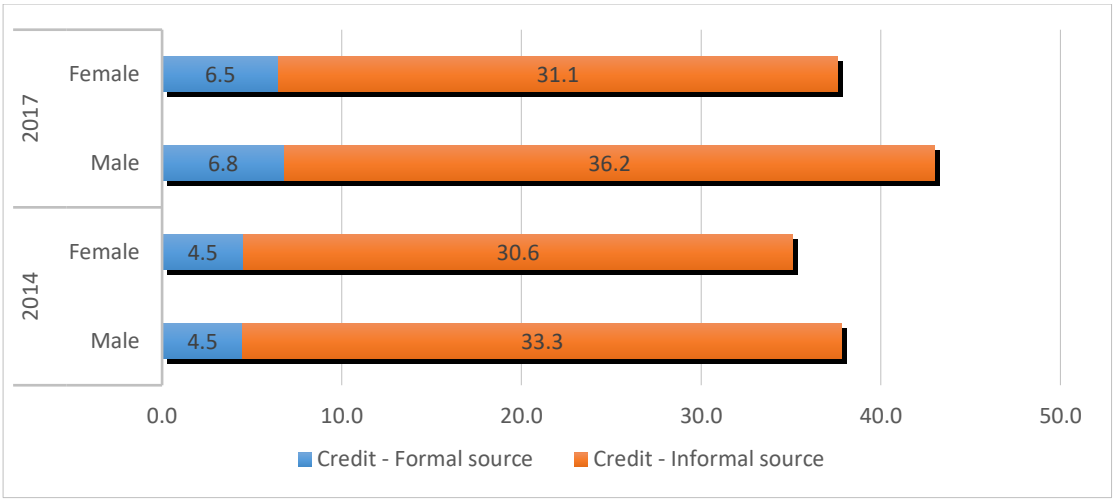

Figure 5. 12: Access to credit across Gender (%)
Credit: Male – 2014 (32.2%), 2017 (45.7%); chi2(1) = 6.4079, Pr = 0.011
Female – 2014 (34.5%), 2017 (39.1%); chi2(1) = 2.0597, Pr = 0.151
2014 – Male (37.8%), Female (35.1%); chi2(1) = 1.43, Pr = 0.232
2017 – Male (43%), Female (37.6%); chi2(1) = 4.37, Pr = 0.037
Source: Findex Survey, 2014 and 2017

5.6.4 Access to Credit across Level of Educational Attainment

The results show that in 2014, access to credit was significantly higher among those with tertiary education as compared to those with primary and secondary education (see Figure 5.13). Those with tertiary education who accessed credit were 24.8 percentage points higher than those with primary or less education and 24.2 percentage points higher than those with secondary education. However, in 2017, there is no significant difference in access to credit across the three levels of educational attainment.

In both 2014 and 2017, a large proportion of Ghanaians within each level of educational attainment accessed credit from informal sources. This means that it is not only those with lower levels of education that access credit from informal sources, but it is equally so for those with tertiary education. As expected, the proportion of those with tertiary education who accessed credit from formal sources was relatively higher than those with primary and secondary education in both 2014 and 2017. This, therefore, means

that the higher one's education, the more likely he/she is to access credit from formal sources as compared to those with lower education. This is partly because those with higher education are more likely to have bank accounts as compared to those with lower levels of education.

This supports Allen et al.'s (2012) findings that the chances of borrowing from a formal financial institution increase among those with higher education. Higher education is linked to higher socioeconomic wellbeing. Therefore, those with higher education are considered as having the financial ability to hold bank accounts, and they can also provide personal guarantees and collaterals needed by banks to access loans (Lotto, 2018).

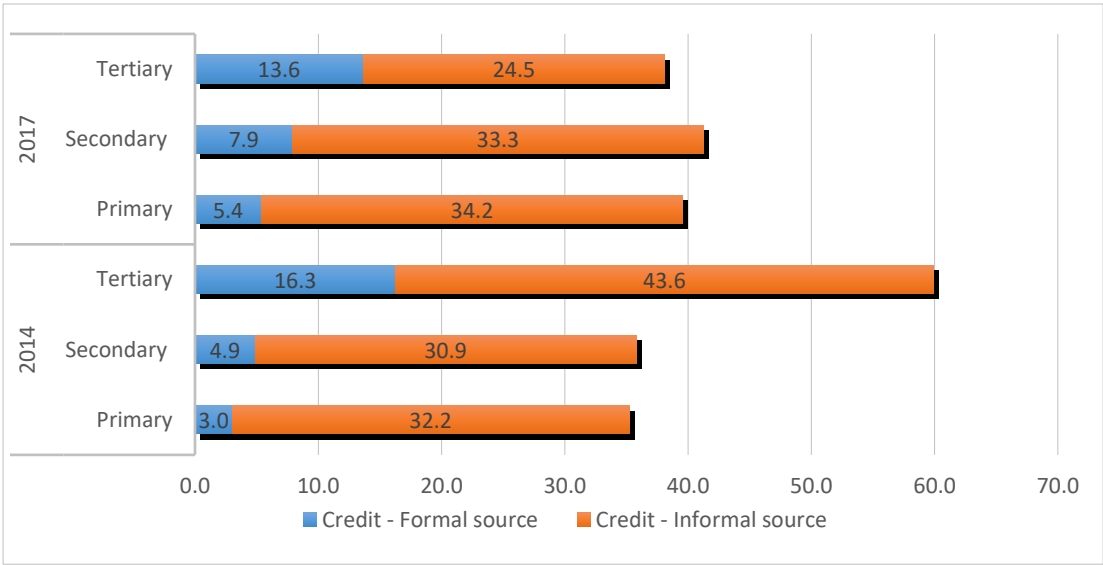

Figure 5. 13: Access to credit across Level of Educational Attainment (%)

Credit: Primary – 2014 (35.5%), 2017 (42.6%); chi2(1) = 4.2503, Pr = 0.039
Secondary – 2014 (35.7%), 2017 (43.5%); chi2(1) = 6.6083, Pr = 0.010
Tertiary – 2014 (52.9%), 2017 (42.6%); chi2(1) = 1.1261, Pr = 0.289
2014 – Primary (35.2%), secondary (35.8%), Tertiary (60%); chi2(2) = 6.26, Pr = 0.044
2017 – Primary (39.6%), secondary (41.3%), Tertiary (38.1%); chi2(2) = 0.09, Pr = 0.955

Type: 2014 - chi2(2) = 5.60, Pr = 0.061
2017 - chi2(2) = 2.53, Pr = 0.283

Source: Findex Survey, 2014 and 2017

5.6.5 Access to Credit across Income Terciles

Between 2014 and 2017, a large proportion of Ghanaians across the income terciles accessed credit from informal sources, as shown in Figure 5.14. Access to credit significantly varied across the three income terciles in 2014 (p-value=0.003), but no significant relationship was found in 2017 (0.382). In 2014, the proportion of Ghanaians within the top 40% income tercile who accessed credit was 8.2 percentage points higher than those within the bottom 40% income tercile and 14.1 percentage points higher than those within the middle 20% income tercile. There was no significant difference in the sources of credit across the three income terciles for both years. That notwithstanding, the results show that the proportion of Ghanaians within the richest 40% income tercile who accessed credit from formal sources was relatively higher than those within the poorest 40% income tercile who accessed credit from formal sources. According to Bigsten et al. (2003) many household members and firms' access credit from informal sources because they don't have the collateral to meet the conditions the formal bank institutions demand. This means that wealth, assets and/or income status play a critical role in determining access and avenue of loan request.

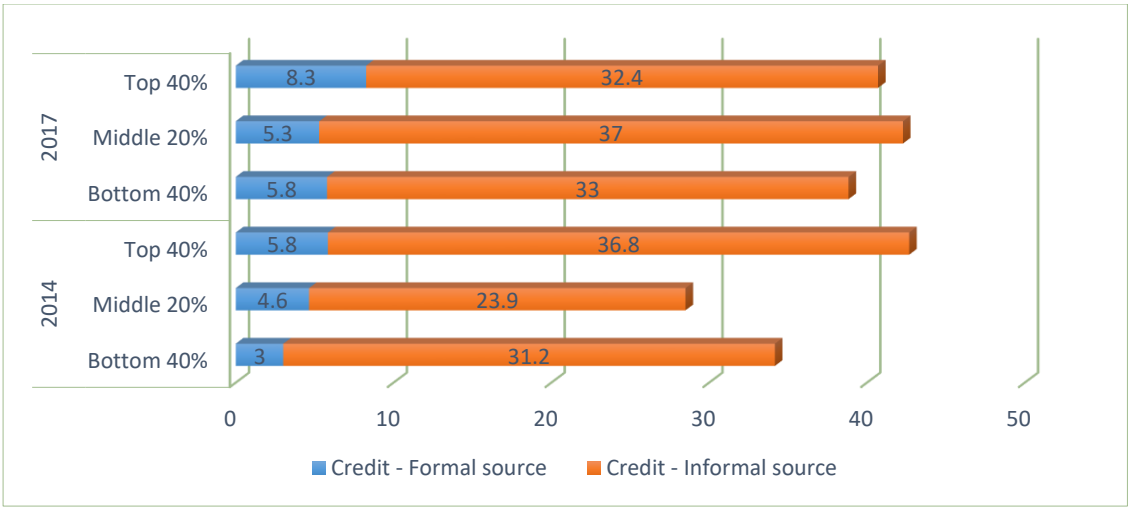

Figure 5. 14: Access to Credit across Income Terciles (%)

Credit: Bottom 40% - 2014 (33.5%), 2017 (41.0%); chi2(1) = 4.1147, Pr = 0.043
Middle 20% - 2014 (28.3%), 2017 (40.4%); chi2(1) = 5.7663, Pr = 0.016

Top 40% - 2014 (41.5%), 2017 (45.1%); chi2(1) = 1.2619, Pr = 0.261
2014 – Bottom 40% (34.2%), Middle 20% (28.5%), Top (42.6%); chi2(2) = 11.94, Pr = 0.003
2017 – Bottom 40% (38.8%), Middle 20% (42.3%), Top (40.7%); chi2(2) = 1.93, Pr = 0.382
Types: 2014 - chi2(2) = 1.90, Pr = 0.386
2017 - chi2(2) = 0.93, Pr = 0.627
Source: Findex Survey, 2014 and 2017

5.6.6 Effect of MoMo on Access to Credit

Table 5.5 presents the results of a recursive bivariate probit model showing the probability that an individual using MoMo: (a) accessed credit; (b) accessed credit from a financial institution; or (c) accessed credit from informal sources. A comparative analysis of the results shows that in 2014, controlling for the demographic characteristics of a person (gender, age, education and income), having a MoMo account did not significantly influence the chances of a person to obtain credit, but in 2017 it significantly influenced the chance of a person to obtain credit by 46.3%.

In the same vein, in 2014, controlling for the demographic characteristics of a person, having a MoMo account was significantly associated with obtaining credit from a financial institution. However, in 2017, having a MoMo account did not significantly relate to obtaining credit from either a formal or informal source. The relatively weaker association between MoMo and access to credit as compared to savings may reflect the fact that there are other barriers to credit. Unlike the formal system, where one can open a bank account and after a period of using the account may be eligible to obtain credit, operating a MoMo account does not make one easily eligible to access credit. Although in some cases there are some credit facilities that users of MoMo can access, these are not widespread and the value of credit one can obtain through those service is very low. Unlike Ghana, Kenya has developed its M-Shwari services to the point that they serve as a major source of access to credit for many MoMo users (Aron, 2018).

Table 5. 5: Effect of MoMo on Access to Credit

Variables	2014			2017		
	Access credit	**Credit from FI**	**Credit from Informal Sources**	**Access credit**	**Credit from FI**	**Credit from Informal Sources**
Female	-0.032	0.027	-0.028	0.016	-0.000	-0.055
	(0.032)	(0.020)	(0.030)	(0.040)	(0.024)	(0.045)
Age	0.021***	0.017***	0.014**	0.006	0.004	0.019***
	(0.006)	(0.004)	(0.007)	(0.007)	(0.003)	(0.006)
Age^2	-0.000***	-0.000***	-0.000**	-0.000	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Educational Attainment (ref: Primary/Less)						
Secondary	0.037	0.027	0.041	-0.046	0.008	0.005
	(0.043)	(0.023)	(0.064)	(0.030)	(0.026)	(0.061)
Tertiary	0.238***	0.111*	0.134	-0.151***	0.031	-0.074
	(0.072)	(0.064)	(0.111)	(0.054)	(0.055)	(0.135)
Income Terciles (ref: Bottom 40%)						
Middle 20%	-0.033	-0.012	0.006	-0.035	0.046	0.092*
	(0.051)	(0.026)	(0.061)	(0.040)	(0.034)	(0.050)
Top 40%	0.099***	0.027	0.102***	-0.024	0.026	0.017
	(0.038)	(0.028)	(0.037)	(0.030)	(0.026)	(0.041)
MoMo User	-0.369*	0.236**	-0.444*	0.463***	0.013	-0.220
	(0.201)	(0.108)	(0.234)	(0.073)	(0.044)	(0.295)
Obs.	992	992	992	957	957	957
Prob>chi2	0.000	0.000	0.000	0.000	0.001	0.000

Estimated marginal effects are presented and robust standard errors are in parentheses.
Standard errors are robust to heteroscedasticity
*** p<0.01, ** p<0.05, * p<0.1
Source: Findex Survey, 2014 and 2017

5.6.7 Purpose of Obtaining Credit

In 2014, the main reason why people sought to obtain credit was similar for both MoMo and non-MoMo users. Both groups accessed credit to build a house or rent an apartment or buy land, followed by unexpected medical expenses among MoMo users and educational purposes among non- MoMo users (Figure 5.15). However, in 2017, MoMo users mainly obtained credit to invest in their business and pay for their medical expenses, whilst non-MoMo users obtained credit mainly to invest in their businesses.

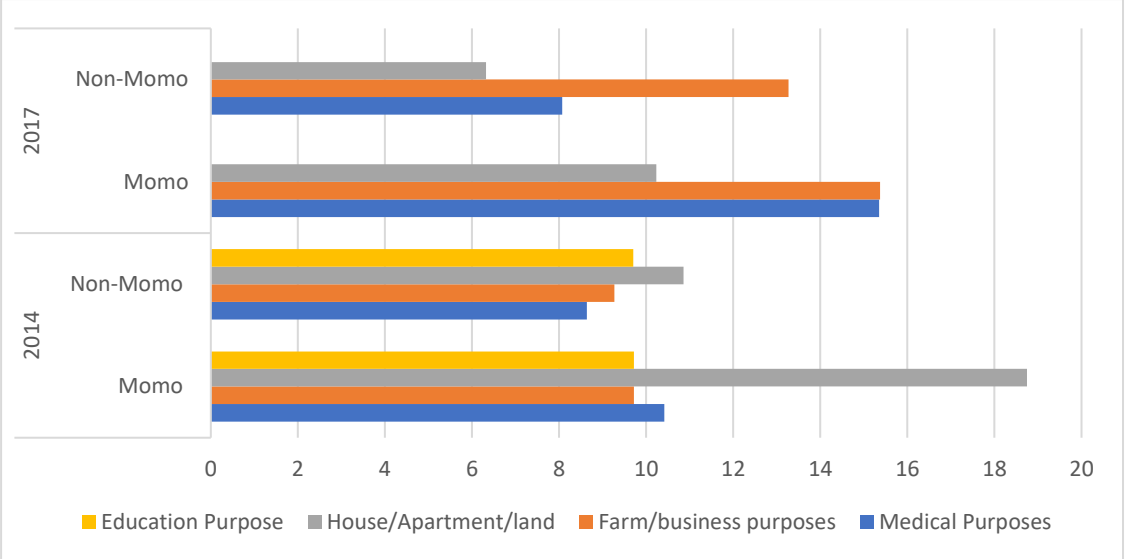

Figure 5. 15: Purpose of Obtaining Credit

Source: Findex Survey, 2014 and 2017

5.7 Effect of Ownership of Financial Institution Account on MoMo Adoption

For a robustness check, a recursive bivariate probit analysis was further conducted to examine the reverse effect of ownership of an account at a financial institution on the adoption of MoMo. The results show that controlling for the demographic characteristics of the respondents, having an account at a financial institution has a positive effect on the chances of opening a MoMo account in both years. The results presented in Table 5.6 show that in 2014, there was a 38% chance for people who already have an account at a financial institution to adopt MoMo, and this probability increased to 43.6% in 2017. This means that there is a symbiotic relationship between account at a financial institution and having a MoMo account: MoMo influences people to open an account at a financial institution, and ownership of an account at a financial institution causes people to open a MoMo account.

This also means that, inasmuch as those who were financially excluded are adopting MoMo, those who are already financially included (using an account at a financial

institution) are adopting the service equally or even more. This increasing adoption among those who are already included may be explained from the integration of MoMo into bank accounts, where bank account holders can make payments from their accounts to MoMo users. This convenience in financial transactions may have contributed to the increasing adoption of MoMo among people already using bank accounts.

This result may explain why in 2017 (when MoMo adoption among the excluded was relatively high, as compared to 2014), the effect of MoMo in accessing formal financial services like savings and credit was insignificant but savings in a MoMo wallet was significant. Thus, it is easy for someone who already has an account at a financial institution to incorporate MoMo into his/her demand for formal financial services. But without formal financial services, it will be difficult to access formal financial services through a MoMo account. This may therefore explain why the MoMo service providers are bringing some formal financial services (such as earning interest on savings, accessing credit through MoMo, paying of bills, receiving Western Union transfers through MoMo and even buying treasury bills through MoMo) to MoMo users on the mobile platform, acknowledging the difficulty that may exist for MoMo users to graduate into the formal financial stream.

Table 5. 6: Ownership of Financial Institution Account on MoMo Adoption

Variables	**MoMo Adoption 2014**	**MoMo Adoption 2017**
Female	-0.019	-0.051
	(0.021)	(0.062)
age	-0.004	0.000
	(0.005)	(0.008)
Age^2	0.000	-0.000
	(0.000)	(0.000)
Education (ref: Primary or Less)		
Secondary	-0.005	0.021
	(0.030)	(0.076)
Tertiary	-0.103*	-0.044
	(0.054)	(0.197)
Income Tercile (Ref: Bottom 40%)		
Middle 20%	0.018	0.055
	(0.030)	(0.067)
Top 40%	0.017	-0.005
	(0.026)	(0.052)
Financial Inst. Account	0.380***	0.436**
	(0.039)	(0.172)
Observations	992	957

Estimated marginal effects are presented and robust standard errors are in parentheses.
Standard errors are robust to heteroscedasticity
*** p<0.01, ** p<0.05, * p<0.1
Source: Findex Survey, 2014 and 2017

5.8 Barriers to Financial Inclusion in Ghana

Unlike Zins and Weill (2016), who categorized the barriers of financial inclusion into voluntary and involuntary, this study categorizes the barriers into financial and non-financial barriers. Voluntary and involuntary classifications are very subjective and value-laden, hence the re-classification. Factors in the Findex data that can be categorized under financial exclusion were lack of money and expensive nature of the service. All the other factors in Figure 5.16 can be classified as non-financial barriers. In both 2014 and 2017, the major reported barrier to financial inclusion in Ghana was lack of money. In 2014, the majority of Ghanaians (75.6%) cited lack of money as their

major reason for not having any account, although this proportion reduced to 48.3% in 2017. Thus, the main barrier to financial inclusion is financial in nature. Among the non-financial barriers, in 2014, distance to the nearest financial institution was cited as the major reason, whilst in 2017 issues such as lack of documentation in opening an account and distance to the nearest financial institution were cited as important barriers to financial inclusion. Others also indicated that they have no need for financial services.

According to Fungácová and Weill (2015) those who are poor lack money to participate in the formal financial system. Even where there is another person in the family who has an account, they are more likely not to adopt a financial service. Some of the more educated who are not financially included also complained about the high cost and lack of trust in the formal financial system. Thus, the perceived service charges or costs associated with the formal financial service can deter some categories of people from participating in formal financial activities.

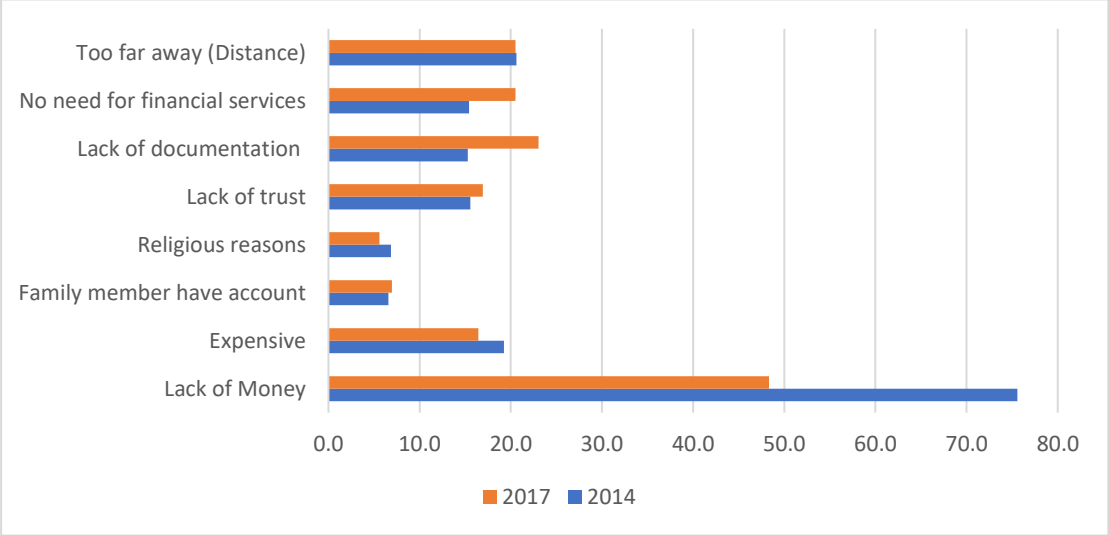

Figure 5. 16: Barriers to Financial Inclusion in Ghana (%)

Source: Findex Survey, 2014 and 2017

5.9 Conclusion

MoMo is indeed an innovation that is driving financial inclusion in Ghana. In less than a decade into its incorporation into the Ghanaian financial market (reference to 2009 – 2017), it has transformed the financial inclusion landscape by providing the previously excluded with convenient, affordable financial services, ranging from transfers to savings and even to credit (though in small amounts). As of 2017, MoMo has provided financial services to 15.4% of Ghanaians who had no financial account and provided an additional convenient financial service to 23.4% of Ghanaians who have an account at a financial institution.

The results have shown that MoMo is driving many people to save. Between 2014 and 2017, there was a 15.7 percentage point increase in the proportion of people who save in only a MoMo account. This includes people who previously saved through informal means and who have started gaining trust in MoMo as a relatively secure place to keep their savings. This is a positive sign for greater financial inclusion, as people do not just use MoMo as a tool for transfers but also as a means for mobilizing savings, especially among the previously excluded segment of the population. Among other determinants, the use of MoMo also appears to encourage people to access credit.

Despite the remarkable performance of MoMo in financial inclusion, the results further show that in terms of graduating people to using formal financial services, MoMo adoption reinforces the financial inequality gap rather than bridging it. Evidence from the analyses shows that MoMo adoption is high among the educated, those within the rich 40% income tercile, as well as those already using a financial account. A large proportion of those who save through MoMo only or through both MoMo and bank accounts are people with higher education and in the top 40% income tercile. Similar

results were observed in terms of access to credit. Thus, there is a positive socioeconomic gradient to MoMo adoption and use.

Finally, even though the major challenge to financial exclusion – lack of money – is beyond redress by providers and regulators, other barriers such as expensiveness of the service, distance, lack of documentation and lack of trust can be addressed to improve the country's financial inclusion performance.

CHAPTER SIX

ROLE OF REGULATION IN FACILITATING FINANCIAL INCLUSION THROUGH MOBILE MONEY

6.1 Introduction

Many studies on mobile financial services or digital financial services have paid much attention to the micro-level factors that promote or hinder adoption, such as demographic, technology-based and social factors (Amoh, 2016; Osei-Assibey, 2015, Dzokoto & Appiah, 2014; Sedzro, 2013). Only a few empirical studies have looked at the role of macro-level indicators in enhancing or inhibiting financial inclusion, chief among which is regulation. This chapter looks at the role of regulation in facilitating financial inclusion through mobile money in Ghana. This chapter presents the results of in-depth interviews conducted with key players in the mobile financial inclusion space, which are: Bank of Ghana (BoG), National Communication Authority (NCA), Ghana Interbank Payment and Settlement Systems Limited (GhIPSS), Ghana Chamber of Telecommunications (GCT), MTN, and AirtelTigo.

Ghana's regulatory effort to drive financial inclusion has gone through some changes. The first section of this chapter therefore looks at the various regulatory changes Ghana has gone through from 2003 to 2017. It specifically contains a review of the regulations and experts' assessment of those regulations. The subsequent sections look at participants' assessment of the regulations, the effect of regulation in expanding financial inclusion, and the rigidities within the current regulation governing mobile money operations in Ghana. Participants' suggestions on the proposed regulatory reforms that can enhance mobile financial inclusion are also presented in this chapter.

6.2 Changes in the Mobile Money Regulatory Environment

Ghana's payment system, under which MoMo falls, refers to the entire matrix of institutional infrastructure arrangements and processes set up to enable economic agents (individuals, businesses, organizations and government) to initiate and transfer monetary claims in the form of commercial and central bank liabilities. According to BoG records, Ghana's payment system has improved significantly since 1997, when the magnetic ink character recognition code (MICR) cheques were introduced, and the payment system continues to evolve to meet the developmental needs of the country. Ghana's payment systems development is being driven by economic, financial and public policies, as well as by the local ICT industry and global trends in payment systems. The Central Bank's principal objectives driving these developments in the payment systems include: the prevention and containment of risks in payment, the establishment of a robust oversight and regulatory regime for the government, and the ability to deepen financial intermediation. Further objectives are: the discouragement of the use of cash for transactions whilst encouraging the use of paper-based instruments for payments as part of the short-term development plan, the promotion of financial inclusion without risking the safety and soundness of the banking system, and the development of an integrated electronic payment infrastructure that will enhance interoperability of payment and security infrastructures.

Ghana's quest towards enacting and enforcing tight regulations to promote financial inclusion began in 2003 when the Parliament of Ghana passed into law the Payment Systems Act – 2003 (Act 662). Acting on the mandates in the Act, the Central Bank in 2008 issued the Branchless Banking Guidelines to commence MoMo operations in Ghana. In 2015, these guidelines were replaced with the Electronic Money Issuer (EMI) guidelines. The EMI guidelines are the current regulation governing MoMo operations

in Ghana. That notwithstanding, in 2017 the Central Bank presented a legislation for cabinet consideration termed the Payment Systems and Services Bill (2017) to replace the EMI guidelines.

According to the BoG, the regulatory changes Ghana has undergone have been precipitated mainly by the drive of the Central Bank to maintain safety and efficiency in the payment system, and also to promote financial inclusion. Other factors driving the changes are: technological advancement (digitization), modernization and the quest to adopt models that meet international standards. In their view, the regulatory changes are also intended to solve emerging challenges such as reducing cyber security issues and fraud in the system. A review of the three regulations is presented below.

6.2.1 2003 Payment System Act (Act 662)

According to the BoG, as far back in 2003, it was realized that Ghana can make use of the technological evolution to extend financial services to those who are excluded from the formal financial system. Therefore, a Payment System Act (Act 662) was passed by Parliament mandating the Central Bank to:

(a) establish, operate, promote and supervise payment, funds transfer, clearing and settlement systems, subject to such rules as it may publish; and

(b) designate any other payment, funds transfer, clearing and settlement systems, operating in the country which the Bank considers to be in the public interest for the Bank to supervise under this Act (Bank of Ghana, 2007, p.165).

Under the Act, the Central Bank may give access to any payment system, fund transfer system, clearing and settlement systems, introduced by a bank, a financial institution or any other institution whose supervision under the Act that the Central Bank considers to be in the public interest. This Act led to the establishment of GhIPSS in May 2007, and the e-zwich payment system which was introduced in 2008 as a tool to drive financial inclusion. During an interview with GhIPSS, it was explained that the universal electronic banking system (also known as e-zwich) was born out of a series of researches into a technology to deploy financial services to Ghanaians living in areas which lacked access to basic financial services. So, the e-zwich account was similar to a formal bank account. According to them:

> At the time of the setup of GhIPSS, there was not much happening in the financial sector. The banks at the time were concentrated in the urban centres due to their commercial nature. So, BoG looked for a service that will allow banking services to be sent to the unbanked, especially those in the rural areas. After series of research, they settled on the universal electronic banking system, which is called e-zwich. It was deployed in 2008 as a platform to reach the unbanked. The e-zwich has features that allowed the technology to be deployed in areas where there was no telecommunication infrastructure. In itself, transactions can be made offline without the need to connect to any network (GhIPSS, personal interview, June 2018).

According to GhIPSS, in order to ensure a successful deployment of the service, the 'Know Your Customer' (KYC) requirements for opening an e-zwich account was very low. There was no registration or account-opening fee. The banks were expected to open the accounts for the customers as well as issue cards for the people for free mainly because the target groups were considered to be poor and, hence, could not afford registration at commercial value.

In the view of GhIPSS, however, the e-zwich system failed to push the financial inclusion agenda, principally because the banks did not see it as profitable. The banks initially injected a lot of investments into the service but were not making enough

returns on their investment. This made many of the banks withdraw their investments, which prevented the system from achieving the expected results. Also, the e-zwich payment system was deployed at a time when the mobile money payment system had started gaining popularity around the world. So, whilst GhIPSS was doing its best to deploy the e-zwich payment system, other players were vigorously looking at ways of deploying the mobile money (MoMo) payment system into the Ghanaian financial market. At the same time, the Bank of Ghana had started the process of drafting the branchless banking guidelines to commence MoMo operations in Ghana. Hence, the e-zwich system did not have the ample time to thrive. The banks were also gradually withdrawing investment into the service.

> It started well, but later, the banks who were relied upon to push this inclusion agenda were not forthcoming, obviously because it was costly to them. The needed investment was high because they needed to buy POS devices to facilitate transactions and yet produce the cards for the people for free. To the banks, the e-zwich was not giving them a quick turnaround to the investments they were making. Most of them began to withdraw from the service. The banks frustrated this BoG dream to achieve financial inclusion (GhIPSS, personal interview, June 2018).

6.2.2 2008 Branchless Banking Guidelines

Branchless Banking was seen as a cheaper alternative to the conventional branch-based banking. The guideline sought to facilitate the provision of financial services to Ghanaians outside the normal traditional branch-based brick and mortar banking system to give room to agency banking to reach out to the unbanked segment of the population. Branchless banking was part of the regulatory approach to promoting financial inclusion in a manner that poses minimal risk to the safety of the banking system.

Like the Act 662, the 2008 branchless banking guidelines followed a financial institution-led model, which required regulated deposit-taking financial institutions or their agents to partner with other market players like telecommunications companies (telcos), technology service providers, and other agents to provide financial service outreach to the unbanked communities in Ghana. The implementation arrangements required the banks to make agency arrangements for the deployment of the service or enter into partnerships with other agent companies such as the mobile network operators (MNOs). The only implementing model allowed under the guidelines was the many-to-many model[5] with the aim of achieving maximum connectivity and outreach as well as interoperability. Though the telcos were considered agents of the banks, since the service was going to be deployed on their platforms, they were required to enter into mandatory partnerships with the many banks. The guideline did not support exclusive partnership. The electronic money (e-money) was held in trust by the banks on behalf of the customers and not the telcos.

All transactions went through the GhIPSS. Under the guidelines, GhIPSS performed three main functions: *'*(i) settle all transactions on real time basis or through a regulated clearing arrangement; (ii) store all proofs of transactions; and (iii) provide a day end reconciliation to all member FIs' (Bank of Ghana, 2008, p.3). Permissible products and services offered under the model included opening and maintaining a branchless banking account, fund transfers (account-to-account and person-to-person), payments (bills, merchants), and loan disbursement and repayment (no active loan service was

[5] There are basically three models: one-to-one model, one-to-many model and the many-to-many model. The one-to-one model is where only one financial institution offers mobile money service with only one telco. One-to-many is where only one financial institution offer mobile money services to customers using many telcos as agents. The many-to-many is where many financial institutions partner with many agents (which include telcos) to provide mobile money service. Many-to-many model does not give any financial institution or telco an exclusive right to offer MoMo service (Bank of Ghana, 2008)

actually offered on the platform, even though the banks were at liberty to disburse loans to their customers on the platform and receive repayments on the same platform).

The 2008 branchless banking led to the commencement of MoMo by MTN in July 2009. According to MTN, their main motive for introducing MoMo was to promote financial inclusion. They picked lessons from Kenya and decided to replicate a similar model in Ghana as a way of providing financial services to their customers, especially to those who are financially excluded. They explained that:

> We launched MoMo in July 2009. The need for financial inclusion was the underpinning value for bringing this service on board. Just as the world today is a global village, we picked lessons from what was happening in Kenya and the impact that MoMo has had on their economy. We thought it will be very useful for us to replicate same here. It provides an opportunity beyond us providing GSM services to our customers to also enrich their lives by adding financial services that will help bridge gaps that the existing financial services, as at the time we were launching, were not providing (MTN, personal interview, October 2018).

Specifically on the regulation, MTN confirmed that under branchless banking, the license to operate MoMo was given to the banks, and the telco was required to partner with many banks and not with only a single bank. MTN partnered with nine banks as a way of meeting the regulatory requirement to commence MoMo operations in Ghana. The challenge therefore was looking for banks who were interested to partner with them:

> The branchless banking guideline was essentially bank-led. Within that framework, you have the banks being the ones who have the permission to drive such as a service. So, in 2009, we had to partner with many banks in order to drive the service. The license will be given to a bank, the bank now finds a technology provider to partner with to bring the service to light. Since the license was given to the bank, we had to look for banks that have an interest in that space to apply for a license from the central bank and then once they have that license, they can by extension of that license partner with us (MTN, personal interview, October 2018).

Within a year after MTN launched MoMo, Airtel (March, 2010) and Tigo (October, 2010) also entered into the MoMo market (Saliu, 2015). According to the Ghana Chamber of Telecommunications (GCT, personal interview), at the initial stages, 'everybody thought it was a crazy intent, that it wasn't something that was going to work'. This was mainly because the providers (telcos) were making huge investments into providing the infrastructure to run the service but returns to the telcos were very low because most of the services at the time were free. The Chamber explained that:

> Most of the transactions (about 75%) going on at the time were free transactions (merchants moving money among themselves and customers engaging in free transactions). So we kept asking ourselves: we see some transactions going on but most of these transactions are free so how are you going to make money because the operator has invested heavily in the infrastructure. They were operating like a little microfinance and susu operators (GCT, personal interview, August 2018).

According to the Bank of Ghana, a diagnostic study carried out at the time showed that the rate of uptake was below expectation. This therefore precipitated the need for a regulatory change to enhance the uptake. According to the Ghana Chamber of Telecommunications, around 2012 and 2013, they saw a growing interest in the MoMo business from the operators, and this made them commence conversations with the Central Bank on how to use the learnings gathered from the few years of operating the service to enhance the existing regulation:

> In 2014, we started active conversations with the Central Bank and the content was that we have allowed the space to grow for a whilst and we think it is time for the Central Bank to step in and take the learning that we have studied over the period and put in some guidelines that will help the running of the operation. So, some of the learning that we had experienced over the period, which had been documented as processes, were pushed to the Central Bank and the Central Bank took a lot of it in as part of their process for consultation in engaging with other partners (banks). This led to the launch of the Electronic Money Issuer (EMI) Guidelines in 2015 (GCT, personal interview, August 2018).

According to Mattern (2018), Ghana's initial deployment of MoMo was seen as a 'fanfare' until after a year into its deployment, when the stakeholder realized that 350,000 Ghanaians were actively using the service. As GCT noted, after some time, a comparative assessment of the country's performance to other countries like Tanzania, which started MoMo only a year before Ghana, gave policy makers, the industry association and service providers the feeling that Ghana could do more with the right regulation to drive the service. This is because, by 2010, the number of active Tanzanians using the service was about 8 million compared to Ghana's 350,000.

Thus, the Central Bank, the industry association and the service providers all realized that the only way to enhance the adoption and subsequently improve the level of financial inclusion in the country was through regulatory change. This was because the branchless banking regulation was serving as a stumbling block to enhancing MoMo adoption.

6.2.3 2015 Electronic Money Issuer (EMI) Guidelines

The inability of the 2008 regulation to increase uptake of MoMo to the expectations of the regulators and service providers, coupled with certain flaws in the model and approach being used, led to the 2015 Guidelines for E-Money Issuers (EMI), known as EMI guidelines. The 2015 EMI guidelines were developed through a broad consultative approach with key stakeholders such as CGAP and the Chamber of Telecommunications. The first draft of the regulation was completed in 2013; after several pushbacks from the banking industry and other players, the Central Bank finally released the EMI guidelines in July 2015 (Mattern, 2018).

The guideline was part of BoG's regulatory strategy to 'promote the availability and acceptance of electronic money for convenient, efficient and safe retail payment and funds transfer mechanisms' (BoG, 2015, p. ii). It also sought to put in place all the necessary controls to mitigate associated risk in the e-money business environment. Unlike the branchless banking guidelines, the EMI guidelines did not give exclusive right to only regulated deposit-taking financial institutions or their agents but also extended the issuance of electronic money to non-bank entities, which are duly licensed by the Central Bank (called Dedicated EMIs). It also did not require any mandatory partnership nor require service providers to issue electronic money using the many-to-many model. The non-banks were 'allowed to establish, own and manage an electronic money business in the form of a separate entity to be supervised by the Bank of Ghana' (BoG, 2015, p. ii). Unlike the branchless banking guideline, which specified a many-to-many model, under the EMI guideline, no business or partnership model was dictated for the service providers. During the interview, the Bank of Ghana explained that since the core mandate of the telcos is not deposit taking, the guidelines allowed them to form subsidiaries to receive a license from BoG to issue e-money. This was to ensure that they do not undermine the quality of their core mandate of providing telecommunication services to the people of Ghana.

Under the EMI guidelines, customers were grouped into three main classes based on the KYC requirement, and each class has its own transaction limit. The minimum KYC accounts require very low documentation in the opening of an account and has a corresponding very low transaction limit. The daily aggregate and the monthly transaction limits were GH¢300 and GHS¢3,000, respectively. The medium KYC accounts require intermediate documentation and are subject to moderate daily and monthly transaction limits of GH¢2,000 and GHS¢20,000, respectively. The enhanced

KYC accounts require documentation equivalent to the requirements for opening of a bank account and give customers high aggregate daily and monthly transaction limits of GH¢5,000 and GHS¢50,000, respectively. The guideline also made some provisions for consumer protection policies which, among other things, require an e-money issuer to inform its customers when there is any anticipated or actual disruption in the system. It further required the e-money issuer to put systems and processes in place for receiving, handling and addressing customer complaints.

On 20th September, 2016, the Central Bank signed a Memorandum of Understanding (MOU) with the National Communication Authority (NCA). This MOU sets forth a statement of intent between the BoG and the NCA for both parties to collaborate in specialized areas in order to enforce and ensure compliance with the financial laws, regulations, directives and guidelines of the Bank with respective to mobile money operations.

6.2.4 Payment Systems and Services Bill

In 2016, the Central Bank realized that there were many fragmented legislations that needed consolidation to take care of emerging issues that were not adequately captured in the 2015 guidelines. Hence, in 2017, the Central Bank reviewed the 2015 EMI guidelines, 2015 Agents guidelines, and the 2003 Payment Systems Act (Act 662) and consolidated them into a piece of legislation termed the Payment Systems and Services Bill (2017). This bill was passed by Parliament on 21st March, 2019.

According to the Bank of Ghana, the purpose of reviewing the existing legislation and guidelines on the payment systems was to take advantage of the emerging technological changes and innovations, and also to fill the gaps which were identified in the implementation of the Acts and the guidelines:

> The purpose of this Bill is to amend and consolidate laws and guidelines relating to payment systems, electronic money operations and to regulate institutions which issue electronic money and provide payment services (Bank of Ghana, 2017, p.1).

The Central Bank further indicated in the bill that their analysis of the financial market has shown that the development within the payment systems in Ghana is far below expectation. They attributed this slow growth to the rigidities and uncertainties within the existing regulations. Hence, this new bill is expected to bring more certainty to electronic money issuers and to eliminate fraud in the government payroll and most importantly, enhance the 'digitization of revenue collection and other payments' (Bank of Ghana, 2017, p.1).

6.3 Assessment of the Regulations Governing Mobile Money Operation

The first assessment the study conducted was on the appropriateness of Ghana to commence MoMo operation with a regulation. Some countries such as Kenya and Tanzania allowed their systems to evolve before coming in with regulations, but in Ghana, a regulation was put ahead of service deployment. Conflicting views emerged from the respondents' assessment. On one hand, some of the respondents believed that Ghana should not have commenced MoMo operations with a regulation, mainly because at the time mobile money was going to be deployed into the Ghanaian market, there were so many uncertainties in terms of market acceptance and uptake. To enter into such a grey area was risky, especially for the service providers. Therefore, it appeared best for the regulator to give them some space to operate and try different models to identify the most effective ones. MTN explained that even though BoG would have gathered some lessons from Kenya and other countries at the time, they thought it was not sufficient to put forward a regulation to drive the service in Ghana.

Since the socioeconomic characteristics of Ghana are different from other countries, a test-and-learn approach, like that of Tanzania, would have been ideal for BoG to allow the service to evolve for some time before bringing in regulation. MTN explained that:

> In a grey area that is now going to start as at 2008, when nobody had a view of exactly how the system is going to be; whether it was significantly going to impact financial inclusion or not, it was just a risk we were going to take at that time. So some times, if you allow things to develop by itself without putting too many checks in place (at that time) but making sure that the obvious risks are mitigated so that people don't go into that area, you get a lot of innovation coming in and the innovation can now make you see things in a way that you didn't even perceive (MTN, personal interview, October 2018).

On the other hand, both the regulator and some service providers believed that it was right for the country to start MoMo operation with regulation. In their view, since there were already some pacesetters in the market, learning from them to put some checks in place before commencing MoMo operations in Ghana was a proactive decision. For instance, AirtelTigo, which is the second telco to enter the MoMo market, was content with BoG putting certain regulations in place to serve as a check before the commencement of MoMo. In their view, the telcos are profit making organizations and hence, without regulations, the telcos would have charged exorbitant prices that could have affected the consumers and their ability to pay for the service. On the part of MTN, the regulations of other countries like Kenya should have served as a benchmark for Ghana to develop a regulation devoid of the mistakes made by the pacesetters.

> We, as telcos, want money and if we didn't have regulations in place, charges that we will be charging customers will be way above what we are doing today because we are looking at the best way to make money. And so, sometimes it is very good that we have these regulations coming to control some of the things we do (AirtelTigo, personal interview, July 2018).

> Taking a cue from what happened in Kenya where the service started, before regulations came in, it allowed the service to grow and we can now use that as a benchmark since we have regulations to inform how our regulations should evolve. Obviously, there will be a lot of mistakes on their side because they are the pacesetters. But on our side, we have a benefit of some of these earlier deployments to be able to look at where

> they went wrong and put measures in place so that we don't also go that tangent (MTN, personal interview, October 2018).

According to the Bank of Ghana, at the time Ghana was about to launch MoMo, there were already MoMo operations going on in other countries. They, therefore, studied other models and regulations to couch the branchless banking regulation, which was a bank-led model with the motive of 'promoting financial inclusion without risking the safety and soundness of the banking system' in Ghana (BoG, 2008, p.1). However, the Central Bank later realized that the bank-led model was not effective to drive financial inclusion in Ghana. This was mainly because the banks were not interested in making the needed investment to make the service thrive. At the same time, the telcos were very interested in putting in the needed investment. This therefore precipitated the need for regulatory change.

Other respondents noted that the financial institution-led (or bank-led) regulatory model by the Central banks in 2008 was not effective in driving financial inclusion as compared to the 2015 regulatory model. The financial-institution led model had greater restrictions on the activities of the telcos (who were the agents of the banks) as compared to the telco-led model, which had greater liberalization of the activities of service providers. MTN and GCT explained that for a long time, the banks had been trying different models to bridge the financial inequality gap, but none of their models proved to be successful. Therefore, for the 2008 guidelines to put these same banks at the forefront and ask them to deploy agents to extend the service to the unbanked segment of the population was not the ideal route to take. This is mainly because the deployment of agents is very costly, and since a new service was going to take time to gain consumers' acceptance, the banks were not going to make the needed investments and hence would not generate returns in the short term. The Central Bank also realized that the banks were not making the needed investments for the service to thrive:

> It started as a bank-led model where the banks were to deploy the agents, who could be an already established merchant points, individuals who have registered as agents or a telco to provide the financial services. Monies to be mobilized are granular and therefore deploying agents were not much in the interest of banks. The telcos wanted to do more but they were restricted by these mandatory partnerships (BoG, personal interview, May 2018).

> The 2008 branchless banking couldn't stimulate the necessary growth for the fundamental reason that the license was given to the banks. The banks have already been in existence for years and if they had what it takes to drive financial inclusion, they would have driven financial inclusion by themselves a long time ago. So for the mere fact that an existing player who couldn't drive the needed change is still being given a front role to play in driving a role that he has failed to achieve after all this whilst, then obviously, it gives you a certain impression that your growth will still be taunted because there is the natural tendency for them to do things the same way they have done in the past (MTN, personal interview, October 2018).

> The branchless banking guidelines was more focussed on the banks and none of the banks was able to launch any product. Fidelity tried one product but it wasn't successful at the time until mobile money came in (GCT, personal interview, August 2018).

According to Evans and Pirchio (2015), one of the key factors that can enhance the success of any mobile financial system is the nature of the regulation governing the system. Regulations that are liberal or 'light touch' have proven to promote mobile financial inclusion better compared to regulations that are rigid and do not give room for innovation (Macmillan et al., 2016). Liberal regulations, according to Macmillan et al. (2016), usually promote financial inclusion because they have 'minimal limitations on who can operate a mobile money scheme and allow for mobile network operator (MNO)-led mobile money, rather than bank-led schemes which have generally not succeeded' (p. 90). Usually, the KYC requirements in liberal regulations are low and there are minimal requirements for people who want to become agents in providing the service (Bourreau & Valletti, 2015).

Evidence from different countries has shown that telco-led models are more conducive for advancing mobile financial inclusion than bank-led models because of the wide connectivity of mobile networks across space (Evans & Pirchio, 2015). Thus, the mobile networks are able to reach a wider coverage in the rural areas and hence facilitate adoption among the poor. Research has shown that the bank-led models have been unsuccessful in facilitating mobile financial inclusion, mainly because banks are usually slow to adopt innovative approaches to meet the needs of their customers. And more often than not, the regulations under bank-led models are much stricter and hence inhibit the growth of MoMo services (Hernandez et al., 2011).

The findings of this study support the institutional theory dimensions of Khraisha and Arthur's (2018) meta-theory of financial innovation development, which explains that regulation is key to explaining the nature of financial innovativeness in a country's financial system. The authors explain that where the regulation prohibits financial institutions from engaging in certain financial activities, as was the case in the 2008 branchless banking guidelines, it inhibits the growth of the financial system. However, where the regulation encourages market players to be innovative, as was the case of the 2015 EMI guidelines, it promotes financial development by enabling service providers to develop and deploy innovative, cost-effective and customer-driven financial tools and services that meet the needs of customers. This enables them to increase their market share and remain productive, whilst at the same time meeting consumers' needs (Khraisha & Arthur, 2018).

6.4 Role of Regulatory Change in Facilitating Mobile Financial Inclusion

The results in Figure 6.1 below present Ghana's financial inclusion performance before and after the regulatory change. The regulation considered in this section is the EMI guideline. The before period is 2014 and the after period is 2017. The results show that two years after the EMI guideline came into force, there was a 42.5 percent increase in the proportion of the population that was financially included. This performance largely resulted from the increase in mobile money adoption as compared to having an account at a financial institution. Mobile Money adoption following the regulatory change increased by 200 percent, whilst adoption of an account at a financial institution only increased by 20%. This shows that the regulatory change was critical to improving the country's financial inclusion performance.

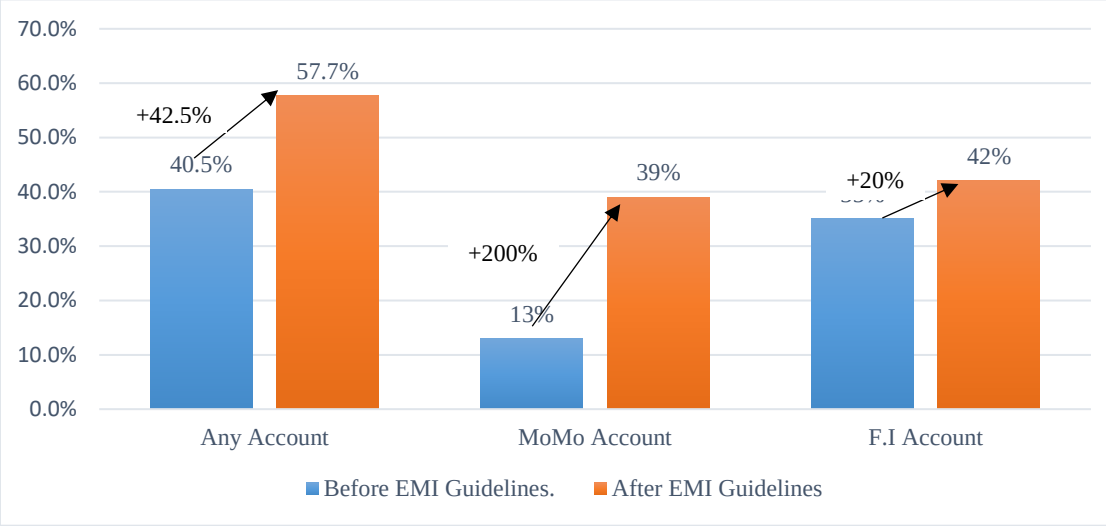

Figure 6. 1: Ghana's Mobile Financial Inclusion Performance Before and After the EMI Guideline

Source: Findex 2014 and 2017 data

As noted earlier, the 2015 guidelines gave non-financial institutions the right to be licensed as Dedicated Electronic Money Issuers (DEMIs) to operate mobile money. This permission, among other things, created the avenue for the expansion of digital

financial services, especially for the mobile network operators, who already had the means of reaching people in almost every corner of the country. It is important to note that the telcos had already made the needed investment for the purpose of their mobile telephone business, and not specifically for their MoMo business. So the regulation permitting them to set up subsidiaries enabled them to profit further from their existing investment in infrastructure. On the other hand, the bank-led model required banks to make new investment that the banks were not willing to make. It is based on this understanding that Mattern (2018) attributed Ghana's performance in the digital financial space to the change in the existing regulation, which gave the telcos the confidence to invest in launching new products as well as deploying agents to facilitate the adoption and use of MoMo in Ghana.

Specifically, on the role of the regulation in financial inclusion, the study found that the EMI regulation was able to enhance financial inclusion because it provided the needed clarity for the service to thrive. According to the GCT, one of the major strengths of the 2015 EMI guidelines over the 2008 branchless banking guidelines was that it brought clarity into the regulatory space. GCT believed that it was the lack of clarity in the 2008 branchless banking guideline that made Vodafone wait until the launch of the 2015 EMI guideline before entering the MoMo financial market. Interesting to note is that Vodafone Kenya successfully launched M-Pesa in Kenya in 2007, which has become a model for many other countries. However, Vodafone Ghana waited until the 2008 branchless banking was replaced with the EMI guidelines before entering the market.

The results further show that the EMI regulation provided clear guidelines on the responsibilities of each player in the digital financial space. According to MTN, regulations in general provide comfort and assurance to both the service provider and the user of the service. To the service provider, both the branchless banking and EMI

guidelines stipulated what was allowable and what was not. In the case of MoMo, given the nature of Ghana's banking sector, it was key that the regulator set such boundaries as a way of giving assurance to the banking players that the entry of the telcos into the financial market was not going to disrupt their activities and, more importantly, was not going to enable the telcos to metamorphose into financial institutions. The telcos under the regulation were not certified as deposit-taking institutions but rather as electronic money issuers, and as such the floats in the accounts of the user were to be held in trust by the banks on behalf of the customers. This provided some comfort to all the players in the financial service market chain:

> For every business, clarity is essential. Immediately the EMI guideline was launched, Vodafone gave the signal that it was going to launch Vodafone cash. Meanwhilst, M-Pesa is a product of Vodacom, which is a sister of Vodafone. M-Pesa, which is the leading mobile money service ever launched across the world belongs to Vodacom. So, the question is why did Vodafone, which first launched mobile money in Kenya, allow MTN to launch mobile money in Ghana and expressed no interest until 2015? They wanted to be sure that there is clarity. So once the 2015 EMI guidelines came in and there was more clarity and something to guide the service, on the back of clarity, they entered the market. Once you have clarity and predictability from the regulator, it became easier to enter the market (GCT, personal interview, August 2018).

> Regulation is there to provide guidelines, comfort and assurance to both the service provider and the user to drive the service adoption. Regulation is very critical because it is what will set the tone for what is allowable and what is not allowable. That is what provide the boundaries for what you can do and what you cannot do (MTN, personal interview, October 2018).

On the issue of risk, respondents explained that regulations are key to managing risks. Without regulations, there will be a lot of abuses in the system. On the one hand, the service provider may charge exorbitant prices that may affect the decision of the consumer to adopt the service. Also, the stakeholders who are investing their monies into providing the service need some kind of assurance that their investments will not go to waste, but will reap some economic gains. Such assurance from the regulator is

essential for the service providers and other stakeholders to undertake the necessary investments to deploy the service to consumers. In effect, the efficiency and effectiveness of MoMo hinges greatly on the provisions of the regulation. GCT also noted that, to some extent, the measures stipulated in the EMI guidelines to mitigate risks related to security, e-money laundering, terrorist financing and other security issues contributed to the investments that went into deploying the service and raising the rate of adoption by the consumers:

> Regulation is also there to curtail risk, to prevent excesses from people. Human as we are, once you have unlimited liberties, things go wrong. So, there should be boundaries within which to operate. For everything you do, there is some level of risk involved. So, regulation provides that assurance to the consumer. It also provides assurance to the EMI because we don't work in isolation, but we work with stakeholders. So, it gives you guideline and also gives you direction on how to operate efficiently and safely within the ecosystem (MTN, personal interview, October 2018).

> Issues surrounding security, e-money laundering, terrorist financing and other security issues were much addressed in the EMI and clarified (GCT, personal interview, August 2018).

Another major role of the regulation in promoting financial inclusion is that it spells out the model and approach for deploying the service. The model and approach are key to enhancing or inhibiting the growth of MoMo uptake. The 2008 branchless banking guideline was unable to drive Ghana's financial inclusion, because it adopted a bank-led model with a lot of restrictions on service providers. The many-to-many model coupled with the mandatory partnerships with the banks all rendered the deployment of the service lethargic, especially on the side of the service providers. However, under the EMI guidelines, the telco can decide to partner with only a few banks. Nevertheless, certain caveats in the regulation may not support the limited partnership:

> The EMI guideline put aside the many to many concept and didn't make it mandatory for that concept. For instance, in 2009, MTN launched the service with nine partner banks. Now, you can decide to partner with a single bank, but obviously there are certain caveats that will not support you to go in that direction. In the framework of the EMI guideline, there

> is a caveat that the total float that a partner bank will hold should not exceed 25% of the shareholders' value of that bank. It is the same rationale behind the single obligor limit concept that is applied here (MTN, personal interview, October 2018).

The study further found that there was no financial motivation for deploying the service in the initial 2008 branchless banking guidelines. Under the 2008 branchless banking guidelines, the service providers (telcos) invested a lot of money in deploying agents to on-board customers, but were not making any gains from the electronic monies the customers kept in their wallets. It was rather the partner banks who benefited from the floats of the customers. However, the 2015 EMI guideline required that, since the banks do business with the float of the customers, they were required to pay an interest (not exceeding 4%) on the float to the service provider. The service providers were required to pay 80% of the interest to the customers and keep the remaining 20%. Both MTN and AirtelTigo confirmed that the 20% interest they receive serve as a great incentive towards float mobilization.

> The banks [are] required to hold the money in trust whilst we do the onboarding and everything. The argument we made [to BoG] was that: I will go and look for so many customers [at my own cost] at an average cost of around ¢5 per customer. With that amount of money, I cannot even use the actual cash that the customer puts on his wallet. I cannot do anything with electronic money. The banks [however] can use it for whatever service they want and gain on it whilst I go around spending money onboarding people and I don't get anything on it. So, the argument was: we also need to make money from whatever funds go to the banks (AirtelTigo, personal interview, July 2018).

> The telcos saw they were doing all the work and the monies were sitting with the banks. They couldn't do anything with the money nor benefit from it because it was held in trust. So, the banks were lending and doing business with the money but the telcos, that were the conduits to the monies coming in, couldn't invest the money (GhIPSS, personal interview, June 2018).

> The Central Bank under the EMI requires that the partner banks are supposed to pay interest on the float they are holding in trust. 80% of that interest is supposed to be paid to the customer and the EMI has permission to retain only 20% of that interest. This has become an incentive for mobilizing deposits. If there is no incentive for mobilizing deposit, definitely, it is negatively going to affect the effort that EMI

> will be required to put in to drive the service. This is because the EMI is the one investing in the visibility driving adoption, acquisition etc. So, they play a significant role in mobilizing the deposits. So, it is only fair that the effort that they have put in in mobilizing that service is rewarded by a certain fraction in terms of whatever benefit that comes with the mobilization of the deposits (MTN, personal interview, October 2018).

> The providers usually negotiate with the banks on how much interest they will pay them on the money they bring to them. Previously, it was only the banks that take the interest when they use the monies to work. So, the EMI regulation made it clear that the operator deserves to receive some of the interest and the customer must also get something. So, based on that the guideline specified that the operator is to negotiate rates between 1.5% and 4% with the banks. So, what happens is that Cal Bank can tell MTN that 'I will give the full 4% threshold'. Fidelity can say 'I will give you 2.5%'. So MTN, who is the custodian of the cash can now determine that if you are going to give me 4%, then I can give you 20% out of the 50m I am getting from the customers; then to the other banks, I will give 5% or 4% of the money I am making, to make sure I am meeting the regulatory requirement. And this is a great motivation to their operation (GCT, personal interview, August 2018).

One of the major strengths of the 2015 EMI guidelines towards promoting adoption is the provision for innovation. Unlike the 2008 branchless banking model, the 2015 EMI guideline gave the service providers the liberty to enter into partnership with any service provider and seek approval from the Bank of Ghana to provide any service they deem appropriate on the MoMo platform. This provision in the regulations, according to the service providers, has given them the avenue to provide their customers with innovative services, which previously were not available to them on the platform. This has also increased the pace of growth in the adoption and use of mobile money services in Ghana.

> The current regulation has created a lot of avenues for innovation. This business started as sending and receiving. But over the years, there have been so many services that have come up. Take merchant payments, payment of school fees, booking and buying of airline tickets etc. These added services are all as a result of the regulations. Others are coming in: now you can take loans through mobile money, you can save and earn interest on mobile money and even purchase airtime. More services are even yet to be provided to customers (AirtelTigo, personal interview, July 2018).

> The EMI regulation created an appetite for innovation. The requirements provided the room to provide many innovative services to our customers and this has expanded the use of the service. If the regulation doesn't permit that kind of innovation, then there can be no growth (MTN, personal interview, October 2018).

In 2016, the financial institutions in collaboration with the service providers introduced innovative products and services to meet the needs of the customers at affordable cost. Bank of Ghana approved these products and services with the overall objective of promoting financial inclusion and sustaining price stability. These products were designed to promote digital savings, lending and investment for the previously excluded. Among some of these payments systems products that the Bank of Ghana has given approval is Ecobank Capital Advisors TBILL4AL. Ecobank Capital Advisors (ECA) in collaboration with Ecobank Ghana Limited and MTN Ghana in 2015 received approval to sell Treasury Bills on the MTN mobile money platform. It was aimed at mobilizing funds from the informal sector and engendering financial inclusion. MoMo subscribers are now able to purchase Treasury Bills for as low as GH¢1.00 (value) using their mobile phones.

Another product is AFB Financial Service's 'Quick Loans'. AFB financial service in partnership with Mobile Money Limited introduced 'Quick Loans' with the view to provide micro-loans to customers using MTN Mobile Money platform. The product aims to support financial inclusion efforts in Ghana by delivering credit through MTN mobile money to the unbanked population. The credit size ranges from GH¢5.00 to GH¢60.00 with a repayment period of 7, 14, or 21 days, depending on the track record of the borrower.

There is also a Tigo Mobile Money direct inward transfer. The Central Bank granted permission to United Bank for Africa (UBA) and Tigo Cash to offer international inward remittance service. The approval allowed Tigo Cash subscribers to receive

Western Union transfer directly into their mobile money wallets. Pan-African Savings and Loans Company has also obtained the Central Bank's approval to link its customers' accounts with their mobile money wallets to offer micro-credit and savings product under the EMI guidelines. Most financial institutions in Ghana have received approval to link their customers' accounts to their mobile money account as a way of providing them with a convenient way of using financial services.

A cursory look at various markets shows that regulation is critical to expanding access to innovative financial services available to MoMo users such as savings, credit and insurance packages. In some regions, the regulations allow for cross-border transfers and payments. Nevertheless, as these services evolve, fraud activities such as SIM swaps and theft of people's money emerge. Regulations are therefore expected to manage these frauds and abuses (Buku, 2017). According to Ofoeda et al. (2012), without a strong regulatory framework, the digital financial system is likely to be flooded with market failures and market inefficiencies. Given that most people are now using MoMo as a means of savings, the existence of regulation plays a key role in protecting consumers' funds from undue risk (Spong, 2000). Spong (2000) further explains that regulations can increase public confidence in the system and safeguard the financial space for market inefficiency and unhealthy competition. Efficiency and competition are cardinal to providing the users with diverse quality services at affordable cost (Mazer & Rowan, 2016; Viscusi, Vernon & Harrington, 2005).

As found in this study, regulation also defines the parameters for the provision of mobile financial services. The type of regulation determines how the market will respond to the service. According to AFI (2010), where the regulation does not promote openness, service providers are usually confined to the traditional products and services they set out to deploy. But where the regulation is liberal and gives room for innovation,

service providers expend resources to partner with other service providers to launch and sustain the deployment of many innovative services that meet their customers' needs (Porteous, 2006). Regulation is therefore cardinal to the growth of mobile financial inclusion.

6.5 Rigidities within the Current Regulations

The service providers noted some major bottlenecks to growth in the current regulatory requirements. The transactional limit is one of the major rigidities within the current EMI guidelines that the service providers (both MTN and AirtelTigo) raised as a feedback they are getting from their customers. The guidelines have certain daily and monthly transactional limits that users cannot exceed based on their level of KYC account. As consumers continue to use the service, they develop more appetite to do more on the service, but are usually constrained by the transactional limits. Some of them currently pay their rent and bills using the service. The transaction limit within the regulation sometimes inhibits the extent to which customers can use the service on a daily and monthly basis:

> One of the things that has come across as a feedback from customers is the transaction limit, which requires enhancement to enable them to do more on the service than they can do today. Today, if you use the service for a whilst, you begin to appreciate the benefits of the service and you will realise that it makes life very convenient for you. So, as your appetite goes up, you decide to do more on the service (MTN, personal interview, October 2018).

> The industry is growing very fast, yet still there is a daily transaction limit which hinders peoples' ability to spend beyond a certain threshold. So, based on the KYC you have, you have a limit of transaction you can do in a day, and I think we need to review that (AirelTigo, personal interview, July 2018).

The other issue revolves around fraud and abuses, which relates to consumer protection. Various stakeholders as well as service providers who were interviewed raised issues

with complaints they receive from customers on wrong transfers and how it could be reversed. According to GhIPSS, besides wrong transfer, they also receive complaints on non-credit of recipient's accounts after the sender's account has been debited:

> Typical challenge is someone sending to a wrong account. We also receive complaints about someone sending money to a person and the account is not credited (GhIPSS, personal interview, June 2018).

NCA also added that most vendors keep their books loosely such that fraudsters are able to pick up people's numbers and defraud them. According to AirtelTigo, almost every day, they receive reports of fraud, and there are many scenarios for fraud to occur. It may be the ignorance of the customer who gives out his pin to a vendor. Some agents may also charge customers wrongly, or third parties whom the service providers give access to their platforms, may be sharing their access codes with other external parties without the permission of the service provider:

> It could happen that customers are sharing their pins out of ignorance. Most of the customers sometimes walk to an agent and say this is my phone, do this kind of transaction for me and even goes to the point of sharing the pin with that agent. How trustworthy can that agent be? That agent might even not be alone. There might be someone sitting beside that agent and you have already exposed your pin. It could happen that agents are charging customers wrongly and it could happen that third parties we give access to our platform could be sharing their access codes with other external parties and these are all avenues for fraud (AirtelTigo, personal interview, July 2018).

NCA also noted that some of the SIMs currently in circulation are not properly registered or not registered at all, even though the telcos claim all SIMs are properly registered. It is based on this observation that NCA directed all telcos to ensure that all SIMs be properly registered with a National ID. NCA also raised the issue of SIM swaps and SIM cloning. It was explained that once your SIM is swapped or cloned, payments in your accounts can be authorised. Therefore, as a measure to mitigate this problem, NCA has request the telcos to send their SIM replacement procedures to enable the NCA to determine the KYC details undertaken during replacements.

According to NCA, these issues need to be adequately addressed in the regulation. The service providers (MTN and AirtelTigo), however, refuted the SIM swaps and cloning points raised by NCA, explaining that even if someone successfully cloned or swapped another person's SIM, he/she will need the pin number to access the money on the wallet.

NCA also noted that it has realized that the telcos segregate the complaints they receive and pay most attention to those customers who make high transactions. Thus, customers who make high transactions through mobile money are attended to faster when they make complaints as compared to the others. Instead of the usual short code of 100 for handling complaints, NCA is advocating a separate code to attend to mobile money complaints. The telcos, however, refuted the segregation of calls. Still on complaints, NCA noted that, unlike Nigeria, it does not get to know the type, frequency and seasonality of complaints that the telcos receive. Meanwhilst, it is imperative for NCA to know the type of complaints the telcos receive, the seasonal nature of those complaints and the extent to which the complaints are handled, so that BoG's attention can be drawn to them if the need arise.

AirtelTigo seems to agree with NCA on the latter point that there is a lack of regulatory enforcement. According to them, even though there are regulations in place, the regulator needs to periodically conduct a spot check to assess the extent to which the regulations are being enforced and the extent to which the agents are complying with the regulations:

> I don't see any enforcement. There are regulations but are they being enforced? I have been working here for almost five years and there hasn't been any single instance where the regulator passed by to do an audit. We send reports to them on a monthly basis. They ask questions if they want to but there have not been any spot checks. For instance, the requirement for an agent is that you need to display the fee or the tariff poster clearly for the customer to see. I have never come across an

> instance where the regulator has gone out to do an audit to check if every agent is abiding by this regulation. As a telco, for every agent I bring on board, I need to ensure that they have the proper branding to be able to notify my customers that he provides my service. All that is not been checked (AirelTigo, personal interview, July 2018).

Lack of system checks was another concern raised by AirtelTigo. According to them, the regulator needs to periodically check the service provider to assess the extent to which their systems are in compliance with the regulatory requirements:

> Is my system in compliance with what the regulation says? Maybe there are shortfalls. The regulator sitting at one point for me to send them reports, are they able to check if my system is complying with the regulatory requirements? As to whether they have the right resources to do that is another problem (AirtelTigo, personal interview, July 2018).

Research has shown that bringing technology and providing the enabling infrastructure is not adequate for people to use digital financial services. One other key issue is for government to put in place appropriate regulatory measures to ensure that the consumer is well protected in the digital financial space (Demirgüç-Kunt et al., 2018). This is mainly because consumer protection regulations are very cardinal to protecting the consumer from abuses and fraud that may erupt in the digital space (Aker et al., 2016; Brune et al., 2016). Such protections serve as a form of assurance to the poor and to women, who are usually financially inexperienced (Demirgüç-Kunt et al., 2018).

Further, research has shown that in an environment where some people are financially excluded because they do not trust the system, as in the case of Ghana (refer to previous chapter), strong consumer protection regulations and standards as well as quality products and services are essential to promote financial inclusion. People will most likely adopt a service that gives fair treatment to its customers and provides them with convenient, quick and effective redress to their concerns (Demirgüç-Kunt et al., 2018). This therefore means that having a digital technology is not adequate to promoting financial inclusion. For people to benefit from the system, the government must ensure

that the physical infrastructure as well as the payment systems are well developed, the regulation is appropriate and there are vigorous safeguards and institutions in place to protect the consumer from any fraud or system abuses (Demirgüç-Kunt et al., 2018).

The Central Bank has acknowledged that the 2015 EMI guidelines do not effectively addresses certain illegal engagements within the digital financial space, especially, the activities of financial technology companies (Fintechs). But the bill before cabinet contains vigorous measures to safeguard the digital payment system from abuses and 'illegal engagements'.

6.6 Regulatory Reforms to Enhance Mobile Financial Inclusion

Notwithstanding the performance of Ghana from 2009 to 2017, there are still many Ghanaians who do not own any account. The Findex 2017 survey shows that there are about 7.3 million Ghanaians who are financially excluded. This means that there is still the potential for growth, and regulatory reforms are essential to make this happen.

One of the regulatory reforms that were suggested by the respondents is the expansion in the transaction limits. The service providers consider the thresholds within the various KYC classes as small; they believe that expansion would enable users to do more on the service such as paying rent and other transactions. The service providers further noted that the regulations allow for only one-way international remittance but not international transfer of funds. As noted earlier, AirtelTigo in partnership with UBA, for instance, have received certification from the Central Bank to enable their customers to receive Western Union transfers directly into their mobile money wallet. However, customers are unable to send international transfers (e.g. make a Western Union transfer) to people outside the country. AirtelTigo, therefore, believes that if the

regulation allows for international transfer of funds, it will boost MoMo adoption and increase financial inclusion. AirtelTigo also believes that the regulator should allow people to transfer funds within the same telco across borders:

> Today, sending money outside Ghana is not allowed. With Western Union and others, you can receive but you can't send. But it is an avenue for growth. As Ghanaians, we send money outside a lot. Today, even within the Telcos, say MTN Ghana – MTN Zambia, because it is within telcos, you should be able to allow this, but the regulation frowns on it. Even though I can understand their reasons, it is about time we look at some of these things. So, there is need for regulatory change to allow for international remittances (AirtelTigo, personal interview, July 2018).

AirtelTigo further thinks that BoG needs to put mechanisms in place for ensuring that customers' complaints reach them and are well addressed. BoG also needs to put an audit control in place to ensure that there is both regulatory and systems compliance, and BoG needs to be proactive in responding to the challenges and abuses within the system.

Some of the respondents noted that, currently, mobile money is used mainly for peer-to-peer transfers. The country can, however, boost its financial inclusion performance through MoMo by increasing people's confidence in the service if there is deliberate state intervention to allow the payments for government services (below a certain threshold) to be done through MoMo. Thus, once the government accepts MoMo as a medium for people to file their taxes, register a business or make any other sectorial payments, it will boost the trust of people in the service. In the same vein, the government should also consider making its transfer below certain thresholds (government-to-person) through MoMo service, such as for the Livelihood Empowerment Against Poverty (LEAP) programme. These views were shared by GCT and MTN:

> With mobile money, we can easily buy passport forms, fill the form online and submit, choose an interview date and after two-to-three weeks, my passport is ready. You don't need to engage a 'goro boy.' So

> it's all part of the digitization conversation. The challenge now is P2G (payment to government). The registrar general and other government machineries should begin to accept mobile money payments to avoid people being tempted with money. P2G is very new and we need to work at it to grow (GCT, personal interview, August 2018).

> A deliberate state effort is also required to promote cashless/cashlite transactions. Policy deliberations must keep on going and policies must be enacted that will support cashlite transactions. For instance, if people begin to see the endorsement from the state, recognizing payments by MoMo as a preferred medium of payment for goods and services, it will build more confidence in people to use the service because it is accepted. So, if I go to the VAT office and I want to pay my taxes, payment through MoMo must be accepted. Payment of bills at the ports/airports and booking for airline should be done through MoMo and it should be accepted. Once these forms of payments are accepted, people can leave their homes without carrying money on them because they know that everywhere they go, once they have money in their wallet, it will be accepted. Then that will boost confidence and it will help in driving more adoption (MTN, personal interview, October 2018).

In the view of GhIPSS, government and service providers need to look at areas of investment, insurance and more specifically, the agricultural sector. In their view, MoMo for agriculture sector investment is key, especially for rural residents, because there are only a few players in the sector. They indicated that the 'ultimate goal of financial inclusion is to better the lives of those who are at the bottom of the pyramid so they can earn sustainable economic living not just to give them access to transfers' (GhIPSS, personal interview, June 2018). Hence, as a country, we should be looking at how we can ride on the shoulders of mobile technology, which even the rural poor can conveniently use, to create access to market especially for rural farmers and other players within the informal economy:

> We should be thinking of how we can use the innovation, for instance, give farmers access to markets. In East Africa and other areas, there are technologies used in the agric sector where a farmer can put his details, produce and prices in the system. Based on the information provided, people are able to know the availability, location and prices of the certain products and they can reach them and buy from them. People can pay electronically, and the goods are sent to the person without any physical contact (GhIPSS, personal interview, June 2018).

6.7 Conclusion

Ghana's financial inclusion performance within the post-2015 EMI guidelines period clearly shows the importance of regulation in driving financial inclusion. The results have shown that a flexible telco-led regulatory model has proven to be effective in driving mobile financial inclusion as compared to a restrictive financial institution-led regulatory model. Even with the flexible telco-led models, regulators usually put in place certain risk management and consumer protection policies to protect the investments and interests of both consumers and service providers. The study found that the EMI guideline brought clarity into the system and allowed the issuance of electronic money to be done by other non-financial institutions. It also gave some incentives to the service providers to earn some returns from their investments, and provided similar incentives to encourage customers to use the service to save by giving them the opportunity to earn interest on their savings. Through the liberalization in service provision, there are now many innovative products and services available to customers on the MoMo platform.

It must, however, be noted that regulation alone is not enough to stimulate growth in financial inclusion. Even though Tanzania, for instance, adopted a test-and-learn approach to regulation, between 2014 and 2017, account ownership increased by just 7 percentage points as compared to 17 percentage points for Ghana within the same period. The right regulation coupled with the enabling infrastructure and a matured financial system are therefore critical to facilitating financial inclusion through mobile money.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This study was conducted to assess the role of mobile money (MoMo) in driving financial inclusion in Ghana. It focussed on the drivers and the role of regulation. A review of literature on MoMo and financial inclusion revealed the following gaps:

i. Studies on the drivers of MoMo adoption have not given consideration to the differences that exist within the population to assess how the drivers could vary within a country when the sociodemographic differences of the population are taken into consideration. For financial inclusion purposes, such analysis is critical for policy and planning purposes.

ii. There also exists scanty literature on how MoMo is enhancing financial inclusion by graduating users from just using the service for transfers and payments to using other formal financial services such as formal account, savings, credit and insurance. The few known studies have only focussed on savings.

iii. Studies on mobile money and financial inclusion have paid little attention to the key role of regulation in facilitating service deployment, adoption and use of the service.

Based on these gaps, this study sought to examine the conditions facilitating the adoption of mobile money as a tool for achieving financial inclusion. The specific objectives were: (1) to examine the drivers of mobile money adoption for payments in Ghana and how these drivers vary with the socioeconomic characteristics of the individual; (2) to assess the extent to which mobile money serves as a gateway to the

use of formal financial services in Ghana; and (3) to explore the role of Central Bank regulation in facilitating financial inclusion in Ghana.

The study was guided by two meta-theories: the Venkatesh et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT); and Khraisha and Arthur's (2018) Meta-Theory of financial innovation development. In addition to using secondary data from the World Bank Global Findex database (2014 and 2017), mixed methods were employed to gather additional primary data. A survey was conducted across the country to gather data from 5,200 respondents, and in-depth interviews were conducted with five institutions to assess the role of regulation in facilitating financial inclusion in Ghana. These institutions were: the Bank of Ghana, the National Communication Authority (NCA), Ghana Interbank Payment and Settlement Systems Limited (GhIPSS), the Ghana Chamber of Telecommunications (GCT), MTN and AirtelTigo.

This chapter presents the key findings for the specific objectives. Based on the findings, conclusions are drawn and policy recommendations made. The contributions that the study makes to literature are also presented, as well as the areas for further research.

7.2 Summary of Key Findings

The key findings under the three specific objectives are presented below:

7.2.1 Drivers of MoMo Adoption

The results showed that the drivers of MoMo adoption were gender, education, locality of residence, region of residence, perceived usefulness, cost of transaction, availability/proximity to a service provider and social influence. These factors were found to vary with the demographic characteristics of Ghanaians. For males and

females, education and social influence positively influenced adoption among both groups. Cost of transaction negatively affected the probability of adoption among both groups. However, perceived usefulness only positively influenced adoption among males, whilst ease of use was negatively associated with adoption by females.

Across the three age categories, education, being an urban resident and perceived usefulness positively influenced adoption across people within the youthful, adults and aged groups. Social influence positively influenced the chances of adoption among the youth and adults but not the aged. Cost of transaction also negatively affected the chances of adoption among the youth and the adults but not the aged. Distance from a service provider negatively affected adoption among only the youth.

Across the four educational categories, only perceived usefulness positively influenced MoMo adoption across all the educational categories. Social influence also positively influenced adoption among those who have attained no, basic and secondary education but not those with tertiary education. Age only influenced adoption among those with tertiary education. Residing in an urban area positively influenced adoption among those with no education and basic education. Cost of transaction negatively influenced adoption among those with no and secondary education. Finally, across the two localities of residence (urban and rural), education, perceived usefulness and social influence positively influenced adoption. Aside from these three variables, cost of transaction negatively influenced the chances of adoption in urban areas but not in rural areas.

The motivation for MoMo adoption was: to transfer and receive money to/from relatives and friends, transfer and receive money to/from business partners, pay bills, make purchases, and save. These motivations were also found to vary with the

demographic characteristics of the respondents. The major challenges facing MoMo users were network failures and high charges. Some of the people who have not adopted MoMo explained that the charges are too high; they have no use for it now; or they do not trust it; others were either unaware or were studying it further. These factors also varied with the demographic characteristics of the respondents.

7.2.2 Mobile Money and the Use of Formal Financial Service

The study found that in both 2014 and 2017, ownership of only a MoMo account was higher among people with less or primary education and secondary education as compared to those with tertiary education. A large proportion of those with tertiary education use both MoMo and an account at a financial institution or only an account at a financial institution. Use of a MoMo account only was relatively high among those within the bottom 40% to middle 20% income tercile as compared to those within the top 40% income tercile, who operate a financial institution account or both accounts. These results reinforce the potential of mobile money to drive financial inclusion.

The formal financial services considered in this study were formal accounts, savings and credit. The results show that in both 2014 and 2017, ownership of a mobile money account positively influenced the chances of opening an account at a formal financial institution. The reverse was also true. In terms of savings, ownership of a MoMo account increased the chances of saving at a formal financial institution in 2014 but not in 2017. It must, however, be stated that in 2017, MoMo induced savings mainly through the MoMo wallet. The chances of saving within the MoMo wallet was highly associated with increasing educational and income levels.

Finally, in terms of credit, in 2014, MoMo users were less likely to access credit, but in 2017, using MoMo increased the chances of obtaining credit. This might be attributed

to the innovative services currently available on MoMo platforms that enable users to access credit in small amounts through MoMo. Using MoMo, however, did not have any effect on chances of obtaining credit from a financial institution in 2017. Issues such as lack of money, distance to the nearest financial institution and lack of documentation in opening an account were the major reasons why some people remained financial excluded.

7.2.3 Role of Regulation in Facilitating Financial Inclusion

Ghana has made significant progress in its payment system mainly because of the strong regulatory environment. Unlike other countries, such as Kenya and Uganda, Ghana commenced its MoMo operation through a regulatory-led approach. The first regulation, which was the 2008 Branchless Banking guideline, took a bank-led approach to deploying MoMo into the Ghanaian market. In 2015, the branchless banking guideline was replaced with the Electronic Money Issuers (EMI) guideline. The EMI guideline took a telco-led approach. Among other factors, the regulatory change emerged from BoG's recognition that the banks were not ready to make the needed investment to make the system thrive. The performance of the service in driving financial inclusion was also below the expectations of BoG. Within the same period, the telcos were ready and willing to make the necessary investments to enhance adoption and usage of the service. Hence, the revision of the regulation gave the telcos the license to issue electronic money in addition to the banks.

An assessment by the various institutions that were interviewed showed that putting the telcos at the forefront of the MoMo service has enhanced deployment and adoption of the service. Unlike the 2008 regulation, which had a lot of restrictions on the activities of service providers, the 2015 regulation gave the service providers (telcos) liberty to enter into partnership with any other service provider to obtain license from the Central

Bank to deploy innovative services on the MoMo platform. This provision has opened MoMo services from just transfers and payment to presenting users with opportunities to obtain credit (though in small amounts), purchase of treasury bills, pay bills, and receive Western Union transfers direct into their MoMo wallet, among many other services.

The results further show that the 2015 EMI regulation provided clarity for the needed investment to be made. It also motivated the service providers to invest more into deploying the service by making provision for both the service provider and the customer to earn a proportion of the interest on the float they mobilize. It also provided comfort and assurance to both the service provider and the user of the service. Also, to some extent, the measures stipulated in the EMI guidelines to mitigate risks related to security, e-money laundering, terrorist financing and other security issues contributed to the investments that went into deploying the service and in raising the rate of adoption by the consumers.

Despite the contribution of the regulation to enhancing MoMo service deployment and adoption, one of the major rigidities within the EMI regulation is the transaction limits on users within various levels of KYC account. Stakeholders were also concerned about fraud and abuses, which relate to consumer protection. Service providers were also concerned about the lapses on the part of the Central Bank in auditing both service providers and agents to assess the extent to which they are complying with the regulatory requirements.

Recognizing that there are multiple regulations in the system, in 2017, the Central Bank took step to consolidate the regulations into one regulation called the Payment Systems and Services Bill. This bill was just passed by parliament on 21st March, 2019. Key in

the bill is the recognition and regulation of the activities of the Fintech companies in driving financial inclusion and strengthening consumer protection policies to ensure sound and safe financial service delivery.

7.3 Conclusion

The results of this study show that MoMo is indeed a novel financial tool for driving financial inclusion in Ghana, among the other tools that Ghana has deployed to bridge the financial inclusion gap over the years. The results of the study showed that the major drivers of MoMo adoption were perceived usefulness, cost of transaction and social influence. These factors vary with the demographic characteristics of the respondents. These results support the UTAUT view that the drivers of technology adoption are likely to differ according to the demographic characteristics of the population. For financial inclusion purposes, the study found that cost of transaction reduces the probability of adoption among those with no or low education and of women. The high service charges in using the service were also found to be a major reason why some people have refused to adopt the service or have opted to remain financially excluded.

The results further show that, even though the adoption of MoMo is relatively high among those with low education and within the low income tercile, the use of MoMo for accessing formal financial service is relatively higher among the educated and those within the top income tercile (who tend to be already financially included) as compared to the less educated and poor. Dzokoto and Appiah (2015) explain that for profitability purposes (not mainly driven by financial inclusion motives), emerging innovative services on MoMo platforms (such as payment of bills and buying treasury bills among others) tend to target people within the middle and the upper income category. This,

therefore, explains why those who tend be already financially included are more likely to use the service to access formal financial services. Those within the low-income categories therefore tend to use the service more for payments purposes. Services targeting the poor, rural residents and useful to the financially excluded are key to promoting mobile financial inclusion.

The study has also shown that regulation is key to facilitating mobile financial inclusion in Ghana. The regulatory model and approach are critical to stimulating the needed investment. Based on the results of this study, it can be concluded that liberal telco-led regulations are more effective in driving mobile financial inclusion than restrictive bank-led regulation. This conclusion stems from the fact that the telcos have already made investments in the telecommunication infrastructure, which makes it efficient and less costly for them to deploy the service as compared to the banks. Based on this understanding, it can also be concluded that regulations alone are not an end in itself but a means to an end. Other essentials are technical infrastructure and a well-developed financial system.

To facilitate financial inclusion, it is essential to pay much attention to financial literacy, especially in terms of the use of digital financial services. The study revealed that fraud and abuses in the MoMo system emanate from two main sources: users who are technologically ignorant and the agents who do not take safety and security precautions by keeping their books loosely. Fraud and abuses affect the trust and confidence people have in the system. This demands proactive measures from the regulators as well as from service providers to ensure that financial service users are well protected through intense financial literacy programmes.

With the pace of annual rates of adoption and active use of the service, coupled with the passage of the Payment Systems and Services Bill and the continuous commitment of service providers to deploy innovative services, Ghana is expected to leapfrog other countries in mobile financial inclusion performance. The results have clearly shown that digital financial services have the potential of enabling Ghana to achieve universal financial inclusion. With the telcos at the forefront and the increasing government commitment and support to facilitate the provision of universal access to electronic communications to the unserved and underserved communities in Ghana through the Ghana Investment Fund for Electronic Communications projects, achieving universal inclusion through mobile financial service is not far-fetched.

7.4 Policy Recommendation

Based on the findings, the following recommendations are made:

The thrust of MoMo adoption rests on the availability of mobile networks. Limited or no network coverage emerged as a major obstacle to mobile money adoption in the study. There are still many rural communities in Ghana with limited, unstable or no network coverage. For adoption rates to continue rising, the telecommunication companies in Ghana should expand their telecom infrastructure, especially to cover the rural areas where the network coverage is poor, and areas that also face limited access to financial services. This should be facilitated by the National Communication Authority, which is the main regulatory body mandated under the law to regulate the operations of the telecommunication companies in Ghana.

Service providers should consider making mobile money services more affordable to the large proportion of Ghanaians who still consider the service expensive. One of the

factors reducing the probability of adoption among those with low education is the cost of transactions. To enhance financial inclusion, the Bank of Ghana should, as a matter of urgency, reduce the high tariffs on mobile money transactions. The 2% service charges on MoMo transactions make MoMo service costlier to users compared to the monthly bank charges. This means that the poor and unbanked are accessing financial services through MoMo at a relatively high cost compared to those who are financially included. Reduction of the 2% tariff would therefore make the service more affordable to those who do not use any formal financial service.

The study found that some of the mobile money users, especially those in the rural areas and even some of the urban residents, find difficulty in using the application. This means that this technology-based service may not be user-friendly to the illiterate. Given that many Ghanaians have not attained much formal education (64.3% of Ghanaians have either no formal education or at most, basic education), the providers should make mobile money services more user-friendly. Recently, the quest to increase the security of mobile money transactions has even made providers add additional security feature to the service when withdrawing funds from one's wallet. This requires a user to 'allow cash-out' before he/she can authorize a payment. To the illiterates, these features may make the use of the service even more complex. Service providers should therefore find innovative ways of making the service user-friendly, or else some of the excluded may not find the motivation to adopt the service. Service providers can provide additional feature such as a voice prompt, which will allow users to follow a voice instruction in the various dominant local languages to make transactions on MoMo.

Some of the non-adopters indicated that they do not trust the service, have no use for it or are studying it further to assess its usefulness to their livelihoods before making the

decision to adopt it. This calls for increasing public education. Many people continue to use mobile money for just transferring and receiving funds because they have limited information on the other financial products available to them through mobile money and even how to access them. The providers of mobile money services (telcos) should intensify sensitization of Ghanaians on the wide range of financial products available to them through mobile money.

Among other factors, mobile money has a positive impact on access to credit even though it does not affect the avenue from which the credit is obtained (formal or informal). Mobile money service can enhance greater access to formal credit if the records of mobile money users can serve as a credit score that facilitates access to credit by users. Since the majority of those within the financially excluded segment of the population are usually those with a low level of education, targeted financial literacy programmes on how to access credit will encourage patronage. Gradual access to these credit facilities will eventually graduate users to the formal financial system, where those who need credit can obtain it to undertake the investments necessary for improving their livelihoods.

To enhance the integration of mobile money users into the formal banking system, interoperability platform between the formal banking service and mobile money platforms should be expanded to open up banking access to unbanked mobile money users. Thus, at the convenience of one's home, without necessarily going to the bank, the MoMo users should be able to open a bank account (of his/her choice) through the mobile money account credentials and link it up with the mobile money account. This will easily open up formal banking services directly to the unbanked.

Financial inclusion and use of formal financial services can also be facilitated through a deliberate effort by all stakeholders to encourage the payments for goods and services through mobile money. The government should take the lead by accepting and making payments through mobile money or other electronic systems. Due to the fragility of the informal sector, the government and service providers should encourage informal sector workers to pay and receive money through their MoMo account. This will reduce the volume of money notes and coins circulating in the system and drive the country toward a cashless society. There is therefore the need to grow and deepen the scope of mobile financial service as a means to an end not as an end in itself.

The relatively low usage of mobile money service among those within the financially excluded segment of the population may arise from the fact that existing financial services favour those in higher socioeconomic groups. There is therefore the need for service providers to offer tailored services towards the needs of those in the low-income low-education category. Some are also excluded because of lack of documentation (such as lack of ID cards). It is expected that after the national identification exercise, every adult Ghanaian will have access to at least an ID card, which is the basic requirement for opening a mobile money account.

As indicated by AirtelTigo, the Central Bank should be proactive in conducting periodic audits on the activities of both the service providers and their agents in the field to ensure that they are complying with the requirements of the regulation. More specifically, in order to reduce the rate of abuses and fraud in the system, the regulator should periodically audit the activities of the agents to check the extent to which they protect their books from intruders who seek access to other people's contacts to defraud them. To ensure that the complaints and concerns of consumers are well addressed, the

Central Bank, as part of its audit, should assess the nature of customers' complaints, the frequency, the seasonality and how they are well addressed by the service providers.

To effectively manage the fraud and other abuses, both the Central Bank and service providers need to be very proactive in putting measures in place to detect illegal activities. Statutory reports from the service providers, GhIPSS and NCA, as well as from media reports, should provide the Central Bank with information on the emerging fraud trends so that early measures can be put in place to alert the general public. The service providers should intensify their financial literacy education especially on subjects relating to pin security and how to avoid wrong transfers. They should conduct proper education for their agents, who are also expected to educate users well, especially those within rural communities, before onboarding them to the service.

7.5 Contributions to Knowledge

The findings of this study add to the MoMo literature by showing that the factors driving adoption vary with the sociodemographic characteristics of the population. For financial inclusion purposes, the study has shown that the factors that promote adoption (such as perceived usefulness and social influence) or inhibit adoption (such as cost of transaction and proximity to service provider) among the excluded segment of the population (usually characterized by no or less education and the low-income quintile) are not always the same factors that influence adoption among those already included.

The study contributes to the financial inclusion literature by highlighting the contribution of MoMo in driving financial inclusion. Specifically, it contributes to the literature by looking at how mobile money is serving as a gateway to using formal financial services such as formal accounts, savings and credit. This study has shown

that ownership of a mobile money account positively influenced the chances of opening an account at a financial institution. It also increases the chances of savings and obtaining credit through MoMo wallet.

This study adds to literature by showing the contribution of regulation to facilitating or inhibiting the deployment, growth and uptake of financial services. The results of this study have shown that the regulatory approach is key to enhancing or crippling innovations to facilitate financial inclusion and to expand the financial services available to MoMo users. The study has shown that liberal telco-led regulations are more effective in driving mobile financial inclusion than restrictive bank-led regulation.

7.6 Areas for Further Research

As noted in Chapter Three, the four indicators for measuring financial inclusion are access, quality, usage and impact. Due to data limitations, this study focused on only the access component. Further studies are needed to assess the other components of financial inclusion. Specifically, future studies can assess the impact of MoMo in improving household welfare, especially among people in the informal sector. Participating in the financial system and using financial tools are expected to enable people to improve their livelihood by smoothening consumption and by managing unexpected shocks. It will therefore be important to look at how mobile money adoption is improving the welfare of the previous excluded.

This study only used repeated cross-sectional datasets (as in the case of the Findex data and the survey) to assess the impact of mobile money on the use of formal financial services. Methodologically, where funds are available, an experimental design like randomized control trials could be conducted in the future to estimate the impact of

MoMo adoption in improving the livelihoods of the previously excluded who adopt MoMo.

Future research can look at how mobile money is affecting expenditures and investments. MoMo give people easy access to their funds at any time, and it will be important to know if that access affects the way they spend. In the same way, it will be interesting to know if MoMo is promoting investment or otherwise. It will also be important that future studies should look at the extent to which users are patronizing the new financial services that service providers are deploying on the MoMo platform. Others can equally look at the impact of MoMo on remittance in Ghana, both at the national and international levels.

REFERENCES

Abdinoor, A., & Mbamba, U.O.L. (2017). Factors influencing consumers' adoption of mobile financial services in Tanzania. *Cogent Business and Management*, 4(1), 1-19.

Abor, J. (2008). Determinants of the Capital Structure of Firms. Research Papers RP No. 176, African Economic Research Consortium, Nairobi, Kenya.

Abrahãoa, R.S., Moriguchi, S.N., & Andrade, D.F. (2016). Intention of adoption of mobile payment: An analysis in the light of the Unified Theory of Acceptance and Use of Technology (UTAUT). *Revista de Administração e Inovação*, 13, 221–230.

AbuShanab, E., & Pearson, J.M. (2007). Internet banking in Jordan: The unified theory of acceptance and use of technology (STAUT) perspective. *Journal of Systems and Information Technology*, 9(1), 71–97.

Ackah, C., & Asiamah, J.P. (2014). Financial regulation in Ghana: Balancing inclusive growth with financial stability. Working paper 410. London: Overseas Development Institute. Available online at https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9287.pdf

ACP Observatory on Migration (2014). Mobile money services: 'A bank in your pocket' -Overview and opportunities. Background Note, ACPOBS/2014/BN13. Available at http://publications.iom.int/bookstore/free/Mobile_money.pdf

Adekanmbi, D.B. (2017). Comparison of Probit and Logit Models for Binary Response Variable with Applications to Birth Data in South-Western, Nigeria. *American Journal of Mathematics and Statistics*, 7(5): 199-208.

Aduda, J., & Kalunda, E. (2012). Financial Inclusion and Financial Sector Stability with Reference to Kenya: A Review of Literature. *Journal of Applied Finance and Banking*, 2(6), 95-120.

Alliance for Financial Inclusion (AFI) (2017). Defining Financial Inclusion. FIS Working Group Guideline Note No. 28

Agarwal, R., & Karahanna, E. (2000). Time Flies When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage. *MIS Quarterly*, 24(4), 665-694.

Ahmed, T.S., Kamal, M.B., Nik Suryani, A., & Tunku, B.T.A. (2011). Investigating students' attitude and intention to use social software in higher institution of learning in Malaysia. *Multicultural Education and Technology Journal*, 5(3), 194–208.

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In J. Kuhland and J. Beckmann (eds). *Action Control* (pp. 11 – 39). Berlin: Springer-Heidelberg.

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Aker, J. C., & Wilson, K. (2013). Can mobile money be used to promote savings? Evidence from preliminary research northern Ghana (Working Paper No. 2012-003). Swift Institute. Retrieved from www.swiftinstitute.org/wp-content/uploads/2012/10/SWIFT-Institute-Working-Paper-No.-2012-003-Mobile-Money-Ghana_v7.pdf [Accessed: 5/2/2018].

Akinci, S., Aksoy, S., & Atilgan, E. (2004). Adoption of Internet banking among sophisticated consumer segments in an advanced developing country. *International Journal of Bank Marketing*, 22(3), 212–232.

Alkhaldi, A.N., & Kharma, Q.M. (2018). Customer's Intention to Adopt Mobile Banking Services: The Moderating Influence of Demographic Factors. *International Journal of Innovation and Technology Management*. Available online: https://doi.org/10.1142/S0219877019500378 [Accessed: 10/5/2018].

Allen. F., Demirguc-Kunt, A., Klapper, L., & Peria, S.M. (2012). The Foundations of Financial Inclusion Understanding Ownership and Use of Formal Accounts. Policy Research Working Paper 6290, World Bank, Washington, DC.

Alliance for Financial Inclusion (AFI) (2010). Mobile financial services: Regulatory approaches to enable access. Policy Note https://www.microfinancegateway.org/sites/default/files/mfg-en-paper-mobile-financial-services-regulatory-approaches-to-enable-access-nov-2010.pdf [Accessed: 17/8/2017].

Altawallbeh, M., Soon, F., Thiam, W., & Alshourah, S. (2015). Mediating Role of Attitude, subjective norm and perceived behavioural control in the relationships between their respective salient beliefs and behavioural intention to adopt e-learning among instructors in Jordanian Universities. *Journal of Education and Practice*, 6(11), 152-159.

Amimo, O., Larson, D.W., Bittencourt, M., & Graham, H. (2003). The potential for financial savings in rural Mozambican households. *Savings and Development*, 28(2), 1 – 15.

Amin, H., Hamid, M. R. A., Tanakinjal, G. H., & Lada, S. (2006). Undergraduate attitudes and expectations for mobile banking. *Journal of Internet Banking and Commerce*, 11(3), 1–12.

Amoh, S. (2016). *Mobile Money Services Adoption and Customer Behavioural Intentions in Ghana* (MPhil thesis). Ghana: University of Ghana. Available online http://ugspace.ug.edu.gh/handle/123456789/21170

Amponsah, S. (2017). The Impacts of Improvements in the Delivery of Credit from Formal and Semi-Formal Financial Institutions: Evidence from Ghana. *Journal of African Development, African Finance and Economic Association (AFEA)*, 19(2), 33-66.

Amu, M.E.K. (2008). *Saving and Investment Behaviour of Rural Families in the Ho Municipality of the Volta Region of Ghana* (M.Sc. Thesis). Cape Coast, Ghana: University of Cape Coast.

Anyanzwa, J. (2019). Mobile money transfer more costly for the poor. https://www.theeastafrican.co.ke/tea/business/mobile-money-transfer-more-costly-for-the-poor-1419372 [Accessed: 20/6/2019]

Anyidoho, N. A. (2013). *Informal Economy Monitoring Study: Street Vendors in Accra, Ghana.* Manchester, UK: WIEGO.

Apiors, E.K., & Suzuki, A. (2018). Mobile Money, Individuals' Payments, Remittances, and Investments: Evidence from the Ashanti Region, Ghana. *Sustainability*, 10, 1 – 26.

Aron, J. (2018). Mobile Money and the Economy: A Review of the Evidence. *The World Bank Research Observer*, 33(2), 135–188.

Aryeetey, E. (2004). A Development-focused Allocation of the Special Drawing Right. WIDER Discussion Paper WDP 2004/3. Helsinki

Aryeetey, E., & Udry, C. (1997). The Characteristics of Informal Financial Market in Sub-Saharan Africa. *Journal of African Economies*, 6(1), 161-203.

Aterido, R., Beck, T., & Iacovone, L. (2013). Access to Finance in Sub-Saharan Africa: Is There a Gender Gap? *World Development*, 47, 102–120.

Atieno, R. (2001). Formal and Informal Institutions' Lending Policies and Access to Credit by Small-Scale Enterprises in Kenya: An Empirical Assessment. African Economic Research Consortium. http://dspace.africaportal.org/jspui/bitstream/123456789/32164/3/RP111.pdf?1

Awrey, D. (2013). Toward a supply-side theory of financial innovation. *J. Comp Econ*, 41(2), 401–419.

Azadavar, R., Shahbazi, D., & Teimouri, M.E. (2011). The role of security as a customer perception on customers' online purchasing behaviour. *International Conference on Software and Computer Applications (IPCSIT)*, Vol. 9. Singapore: IACSIT Press.

Balan, R. K., Ramasubbu, N., Prakobphol, K., Christin, N., & Hong, J. (2009). mFerio: the design and evaluation of a peer-to-peer mobile payment system. *MobiSys '09 Proceedings of the 7th International Conference on Mobile Systems, Applications and Services.*

Bampoe, H.S. (2015). *Mobile Money Adoption in Emerging Markets: A Case of Ghana* (MPhil Thesis). Accra, Ghana: University of Ghana, Legon.

Banda, F., Robb, G., Roberts, S., & Vilakazi, T. (2015). Review paper one: Key debates in competition, capabilities development and related policies: Drawing the link between barriers to entry and inclusive growth. CCRED Working Paper No. 4/2015. Centre for Competition, Regulation and Economic Development, University of Johannesburg.

Bandura, A. (2001). Social cognitive theory of mass communication. *Media Psychology*, 3, 265–299.

Bank of Ghana (2007). Banking and Financial Laws of Ghana: 1998-2006. Ghana: Compiled by Library and Documentation Office (I.D.P.S. Department).

Bank of Ghana (2008). Guidelines for Branchless Banking. https://www.bog.gov.gh/privatecontent/Monetary_Policy/2008/August/regulatory framework for branchless banking.pdf [Accessed: 12/2/2017]

Bank of Ghana (2015). Guidelines for E-Money Issuers in Ghana. Ghana: Bank of Ghana. Available at https://www.bog.gov.gh/privatecontent/Banking/E-MONEY%20GUIDELINES-29-06-2015-UPDATED5.pdf [Accessed: 23/10/17].

Bank of Ghana (2016). Payment Systems Oversight Annual Report, 2016. Ghana: IDPS Department, Bank of Ghana.

Bank of Ghana (2017). Payment Systems Oversight Annual Report, 2017. Ghana: IDPS Department, Bank of Ghana.

Bank of Uganda (BoU). (2015). Annual supervision report: Issue No. 6. Retrieved from https://www.bou.or.ug

Bara, A. (2013). Mobile Money for Financial Inclusion: Policy and Regulatory Perspective in Zimbabwe. *African Journal of Science, Technology, Innovation and Development*, 5(5), 345-354.

Batista, C., & Vicente, P.C. (2016). Introducing Mobile Money in Rural Mozambique: Evidence from a Randomized Field Experiment. https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=CSAE2016&paper_id=1086

Bazeley, P. (2002). Computerised data analysis for mixed methods research. In A. Tashakkori, C. Teddlie (Eds). *Handbook of mixed methods for the social and behavioural sciences* (pp. 385-422). Thousand Oaks, CA: Sage.

Beck, T., & Cull, R. (2015). Banking in Africa. In A.N. Berger, P. Molyneux, J.O.S. Wilson (Eds.), *The Oxford Handbook of Banking* (pp. 913-937). Oxford, England, UK: Oxford University Press.

Beck, T., & Demirguc-Kunt, A. (2006). Small and Medium-size Enterprise: Access to Finance as a Growth Constraint. *Journal of Banking and Finance*, 30: 2931 – 2943.

Beck, T., Behr, P., & Madestam, A. (2011). Sex and credit: Is there a gender bias in lending? European Banking Center Discussion Paper 27.

Beck, T., Demirgüç-Kunt, A., & Peria, M.S.M. (2011). Banking Financing for SMEs: Evidence across Countries and Bank Ownership Types. *Journal of Financial Services Research*, 39, 35-54.

Becker, G. (1975). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education* (2nd ed.). New York: National Bureau of Economic Research.

Beldad, A., de Jong, M., & Steerhouder, M. (2010). How shall I trust the faceless and the intangible? A literature review on the antecedents of online trust. *Computers in Human Behavior*, 26(5), 857-869.

Ben-Horim, M., & Silber, W.L. (1977). Financial innovation: a linear programming approach. *Journal of Banking and Finance*, 1, 277-296.

Bettzüge, M.O., & Hens, T. (2001). An evolutionary approach to financial innovation. *Rev Econ Stud*, 68, 493–522.

Bhatt, V.V. (1987). Financial innovations and credit market evolution. *Economic and Political Weekly*, 22(22), M45-M54.

Bigsten, A., Collier, P., Dercon, S., Fafchamps, M., Gauthier, B., Gunning, J.W., & Zeufack, A. (2003). Credit Constraints in Manufacturing Enterprises in Africa. *Journal of African Economies*, 12(1), 104 - 125.

Boot, A.W., & Thakor, A.V. (1997). Banking scope and financial innovation. *Rev Financ Stud*., 10(4), 1099–1131.

Bourreau, M., & Valletti, T. (2015). Enabling digital financial inclusion through improvements in competition and interoperability: What works and what doesn't? CGD Policy Paper 065. Washington, DC: Center for Global Development (CGD).

Brown, S. A., Massey, A. P., Montoya-Weiss, M. M., & Burkman, J. R. (2002). Do I Really Have to? User Acceptance of Mandated Technology. *European Journal of Information Systems*, 11(4), 283-295.

Bruhn, M., & Love, I. (2014). The Real Impact of Improved Access to Finance: Evidence from Mexico. *Journal of Finance*, 69 (3), 1347–76.

Burhouse, S., & Osaki, Y. (2012). 2011 FDIC National Survey of Unbanked and Underbanked Households: Executive Summary.

https://www.fdic.gov/householdsurvey/2012_unbankedreport_execsumm.pdf [Accessed: 13/2/2018].

Burton-Jones, A., & Hubona, G. S. (2006). The mediation of external variables in the technology acceptance model. *Information and Management*, 43, 706-717.

Camara, N., & Tuesta, D. (2015). Factors that Matter for Financial Inclusion: Evidence from Peru. *The IEB International Journal of Finance*, 10, 8-29.

Carroll, J., Howard, S., Peck, J., & Murphy, J. (2003). From adoption to use: The process of appropriating a mobile phone. *Aust. J. Inform. Syst*., 10(2), 38-48.

Center for Global Development (2016). Financial Regulations for Improving Financial Inclusion: A CGD Task Force Report. Washington DC: Center for Global Development. https://www.cgdev.org/sites/default/files/CGD-financial-regulation-task-force-report-2016.pdf [Accessed: 4/11/2018].

Chakrabarty, K.C. (2011). Financial Inclusion and Banks: Issues and Perspectives. Reserve Bank of India. https://www.bis.org/review/r111018b.pdf [Accessed: 4/11/2018].

Chattopadhyay, S.K. (2011). Financial Inclusion in India: A case-study of West Bengal. MPRA Paper No. 34269. https://mpra.ub.uni-muenchen.de/34269/1/Financial_Inclusion_in_India.pdf [Accessed: 14/8/2018].

Chawla, D., & Joshi, H. (2018). The Moderating Effect of Demographic Variables on Mobile Banking Adoption: An Empirical Investigation. *Global Business Review*, 19, S90-S113.

Chibba, M. (2009). Financial Inclusion, Poverty Reduction and the Millennium Development Goals. *European Journal of Development Research*, 213-230.

Chithra, N., & Selvam, M. (2013). Determinants of financial inclusion: An empirical study on the inter-state variations in India. Available at http://dx.doi.org/10.2139/ssrn.2296096 [Accessed: 14/8/2018].

Chuttur, M. (2009). Overview of the Technology Acceptance Model: Origins, Developments and Future Directions. Indiana University, USA. *Sprouts: Working Papers on Information Systems*, 9(37), 1-21. Available at: http://sprouts.aisnet.org/9-37 [Accessed: 14/8/2018].

Collins, D. (2005). Stocks and Flows - Quantifying the Savings Power of the Poor. Financial Diaries Project Focus Note. Available at www.financialdiaries.com [Accessed: 10/11/2017].

Collins, D., Rutherford, S., & Morduch, J. (2009). *Portfolios of the Poor*. UK: Princeton University Press.

Comninos, A., Esselaar, S., Ndiwalana, A., & Stork, C. (2009). Airtime to Cash: Unlocking the Potential of Africa's Mobile Phones for Banking the Unbanked. Uganda: IIMC, IST Africa.

Consultative Group to Assist the Poor (CGAP) (2011). Global Standard Setting Bodies and Financial Inclusion for the Poor: Toward Proportionate Standards and Guidance. A White Paper Prepared by CGAP on Behalf of the G-20's Global Partnership for Financial Inclusion.

Creswell, J., Fetters, M., & Ivankova, N. (2004). Designing a mixed methods study in primary care. *Annals of Family Medicine*, 2, 7-12.

Cull, R., Ehrbeck, T., & Holle, N. (2014). Financial Inclusion and Development: Recent Impact Evidence. Focus Note No. 92. Available at http://www.cgap.org/publications/financial-inclusion-and-development-recent-impact-evidence [Accessed: 10/11/2017].

Cutler, D. M., & Katz, L. F. (1991). Macroeconomic performance and the disadvantaged. *Brookings Papers on Economic Activity*, 2, 1–74.

Dangi, N., & Kumar, P. (2013). Current Situation of Financial Inclusion in India and Its Future Visions. *International Journal of Management and Social Sciences Research*, 2(8), 155–166.

Davie, R., Panting, C., & Charlton, T. (2004). Mobile phone ownership and usage among pre-adolescents. *Telematics. Inform*, 21(4), 359-373.

Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13, 319–340.

Davis, F. D. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results*. Cambridge, MA: Massachusetts Institute of Technology.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35(8), 982–1003.

Demirci, A.E., & Ersoy, N.F. (2008). Technology Readiness for Innovative High-Tech Products: How Consumers Perceive and Adopt New Technologies. *Business Review*, 10(2), ss. 302-308.

Demirgüc-Kunt, A., Klapper, L., & Singer, D. (2013). Financial Inclusion and Legal Discrimination against Women: Evidence from Developing Countries. Policy Research Working Paper No. 6416. The World Bank, Washington, DC.

Demirguc-Kunt, A., & Klapper, L. (2012). Measuring Financial Inclusion: the Global Findex Database. World Bank. http://go.worldbank.org/J3T8AZ4KX0 [Accessed: 12/2/19].

Demirguc-Kunt, A., Beck, T., & Honohan, P. (2008). Finance for All? Policies and Pitfalls in Expanding Access. World Bank Policy Research Report. Washington, DC: World Bank.

Demirguc-Kunt, A., Klapper, L., Singer, D., & Van Oudheusden, P. (2015). The Global Findex Database 2014: Measuring Financial Inclusion around the World. World Bank Policy Research Working Paper 7255. Washington, DC: World Bank.

Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution. Washington, DC: World Bank.

Demirguc-Kunt, A., Klapper, L., Van Oudheusden, P., and Zingales, L. (2014). Trust in Banks. World Bank, Washington, DC: Development Research Group.

Department for International Development (DFID) (2005). Reducing Poverty by Tackling Social Exclusion: A DFID Policy Paper. London: Department for International Development (DFID).

Demombynes, G. & Thegeya, A. (2012). Kenya's Mobile Revolution and the Promise of Mobile Savings. World Bank Policy Research Working Paper, No. 5988.

Dolan, J. (2009). Accelerating the development of mobile money ecosystems. Washington, DC: IFC and the Harvard Kennedy School.

Domeher, D., Frimpong, J.M., & Appiah, T. (2014). Adoption of financial innovation in the Ghanaian banking industry. *African Review of Economics and Finance*, 6(2), 88–114.

Donner, J. (2005). The social and economic implications of mobile telephony in Rwanda: An ownership/access topology. In: P. Glotz, S. Bertschi, and C. Locke (Eds.), *Thumb culture: The meaning of mobile phones for society* (pp. 37-51). New Brunswick, NJ: Transactions.

Donner, J., & Tellez, C. A. (2008). Mobile banking and economic development: Linking adoption, impact, and use. *Asian Journal of Communication*, 18(4), 318–332.

Donovan, K. (2012). Mobile Money for Financial Inclusion. In *Information and Communications for Development 2012: Maximizing Mobile* (pp. 61-73). World Bank Publications.

Dowuona, S. (2015). BoG issues new Mobile Money guidelines. Available at http://www.myjoyonline.com/business/2015/July-15th/bog-issues-new-mobile-money-guidelines.php [Accessed: 23/10/17].

Draghi, M. (2008). How to Restore Financial Stability. *Bundesbank Lecture Series*, 1-14.

Dube, C., & Gumbo, V. (2017). A Model for Financial Inclusion: The case of the Retail Industry in Zimbabwe. *Business and Management Studies*, 3(3), 10 – 24.

Duffie, D., & Rahi, R. (1995). Financial Market Innovation and Security Design: An Introduction. *Journal of Economic Theory*, 65(1), 1-42.

Dupas, P., & Robinson, J. (2013a). Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya. *American Economic Journal: Applied Economics*, 5(1), 163–192.

Dupas, P. & Robinson, J. (2013b). Why Don't the Poor Save More? Evidence from Health Savings Experiments. *American Economic Review*, 103(4), 1138–1171.

Dzokoto, V. A., & Appiah, E. (2014). Making Sense of Mobile Money in Urban Ghana: Personal, Business, Social, and Financial Inclusion Prospects. IMTFI Final Research Report http://www.imtfi.uci.edu/files/docs/2014/dzokoto_final_report_feb2014.pdf

Echchabi, A., & Olaniyi, O.N. (2012). Using Theory of Reasoned Action to Model the Patronisation Behaviour of Islamic Banks' Customers in Malaysia. *Research Journal of Business Management*, 6(3), 70-82.

Eduku, P.A. (2016). Bank of Ghana to review Mobile money regulations in July. http://citifmonline.com/2016/06/bank-of-ghana-to-review-mobile-money-regulations-in-july/ [Accessed: 23/10/17].

Ellis, K., Lemma, A., & Rud, J. (2010). Financial inclusion, household investment and growth in Kenya and Tanzania. *Project Briefing, Overseas Development Institute*, 43, 1–4.

Etim, A. S. (2014). Mobile banking and mobile money adoption for financial inclusion. *Research in Business and Economics Journal*, 9, 1–13.

Evans, D., & Pirchio, A. (2015). An empirical examination of why mobile money schemes ignite in some developing countries but flounder in most. Coase-Sandor Institute for Law and Economics Working Paper, 723. The University of Chicago Law School. Retrieved from http://chicagounbound.uchicago.edu/law_and_economics/744/ [Accessed: 14/8/2018].

Fafchamps, M., Pender, J., & Robinson, E. (1995). Enterprise Finance in Zimbabwe. RPED Case Study Series. Washington, DC: World Bank.

Falkena, H., Bamber, R., Llewellyn, D., & Store, T. (2001). Financial Regulation in South Africa (2nd edition). South Africa: Financial Sector Forum.

Fanta, A., & Mutsonziw, K. (2016). Gender and Financial Inclusion: Analysis of financial inclusion of women in the SADC region. FinMark Trust Policy Research Paper No. 01/2016.

Finnerty, J.D., & Emery, D.R. (2002). Corporate Securities Innovation: An Update. *Journal of Applied Finance*, 21-47.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behaviour*. Reading, MA, USA: Addison-Wesley.

Flick, U. (2011). *Introducing research Methodology*. Beverly Hills. CA: Sage.

Fungácová, Z. & Weill, L. (2015). Understanding financial inclusion in China. *China Econ. Rev.* 34, 196–206.

Gan, C., Clemens, M., Limsomobunchai, V., & Weng, A. (2006). A logit analysis of electronic banking in New Zealand. *International Journal of Bank Marketing, 24* (6), 360-383.

Gencer, M. (2011). The mobile money movement: Catalyst to jump-start emerging markets. *Innovations*, 6(1), 101–117.

Ghana Statistical Service (2012). *2010 Population and Housing Census Summary Report of Final Results*. Ghana: Ghana Statistical Service.

Ghana Statistical Service (2014). *Ghana Living Standard Survey Round 6 (GLSS 6): Main Report*. Ghana: Ghana Statistical Service.

Goland, T., Bays, J., & Chaia, J. (2010). From millions to billions: Achieving full financial inclusion. McKinsey and Company. Available at https://www.mckinsey.com/~/media/mckinsey/industries/social%20sector/our%20insights/global%20financial%20inclusion%20within%20reach/global_financial_inclusion.ashx [Accessed: 10/5/18].

Government of Kenya (2003). *Economic Survey 2003*. Nairobi: Central Bureau of Statistics Government Printers.

Groppa, O., & Curi, F. (2015). Mobile money regulation: Kenya, Ecuador and Brazil compared. Available at SSRN: https://ssrn.com/abstract=2298781 or http://dx.doi.org/10.2139/ssrn.2298781 [Accessed: 12/4/18].

Guhr, N., Loi, T., Wiegard, R., & Breitner, M.H. (2013). Technology readiness in customers' perception and acceptance of m(obile)-payment: an empirical study in Finland, Germany, the USA and Japan. Proceedings of the 11th International Conference on Wirtschaftsinformatik, Leipzig, Germany, 119-133.

Gutierrez, E., & Choi, T. (2014). Mobile Money Services Development: The Cases of the Republic of Korea and Uganda. *Policy Research Working Paper; No. 6786.* Washington, D.C.: World Bank.

Haddon, L. (2008). Young people's diverse use of multimedia mobile phones. Paper presented at the International Communications Association, Communicating for Social Impact, Montreal.

Hahn, H.P., & Kibora, L. (2008). The domestication of the mobile phone: oral society and new ICT in Burkina Faso. *J. Mod. Afr. Stud.*, 46(01), 87- 109.

Handa, S. (1994). Gender, Headship and Intra Household Resource Allocation. *World Development*, 22(10), 1535-1547.

Hannig, A., & Jansen, S. (2010). Financial Inclusion and Financial Stability: Current Policy Issues. ADBI Working Paper No. 259. Available at http://dx.doi.org/10.2139/ssrn.1729122 [Accessed: 12/4/18].

Harris, M., & Raviv, A. (1989). The design of securities. *J. Financ. Econ.*, 24(2), 255–287.

Henderson, L., Herring, C., Horton, H. D., & Thomas, M. (2015). Credit Where Credit is Due? Race, Gender, and Discrimination in the Credit Scores of Business Startups. *The Review of Black Political Economy*, 42(4), 459-479.

Hernández, B., Jiménez, J., & Martín, M. J., (2011). Age, gender and income: do they really moderate online shopping behaviour? *Online Information Review*, 35(1), 113–133.

Hernandez, J., Bernstein, J., & Zirkle, A. (2011). The regulatory landscape for mobile banking. GSR11 Discussion Paper. Geneva: International Telecommunication Union (ITU). Available at https://www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR11/.../04-M-Banking-E.pdf

Hong, S.-J., Thong, J. Y. L., Moon, J.-Y., & Tam, K.-Y. (2008). Understanding the behavior of mobile data services consumers. *Information Systems Frontiers*, 10(4), 431-445.

Honohan, P., & King, M. (2012). Cause and effect of financial access: cross country evidence from the Fnscope surveys. In: R. Cull, A. Demirguc-Kunt, and J. Morduch (Eds.), *Banking the World: Empirical Foundations of Financial Inclusion*. Cambridge: MIT Press.

Hoofnagle, C. J., Urban, J.M., & Li, S. (2012). Mobile Payments: Consumer Benefits and New Privacy Concerns. BCLT Research Paper. http://dx.doi.org/10.2139/ssrn.2045580 [Accessed: 13/3/2018].

Howard, J., Sakyi-Dawson, O., Harford, N., & Aba, S. (2000). Linking Formal and Informal Financial Intermediaries in Ghana: Conditions for Success and Implications for RNR Development. *Natural Resource Perspectives*, 61, 1–4.

Hughes, N., & Lonie, S. (2007). M-Pesa: Mobile Money for the 'Unbanked' Turning Cellphones into 24-Hour Tellers in Kenya. *Innovations: Technology, Governance, Globalization*, 2, 63-81.

Hussein, Z. (2017). Leading to Intention: The Role of Attitude in Relation to Technology Acceptance Model in E-Learning. *Procedia Computer Science*, 105, 159 – 164.

Igbaria, M., Livari, J., & Maragahh, H. (1995). Why do individuals use computer technology? A Finnish case study. *Information and Management*, 5, 227-238.

Im, S., Bayus, B.L., & Mason, C.H. (2003). An empirical study of innate consumer innovativeness. Available at http://mansci.highwire.org/content/15/5/215.short [Accessed: 3/7/18].

International Monetary Fund (IMF) (2014). Regional Economic Outlook: Fostering durable and Inclusive Growth. Washington, DC: International Monetary Fund.

International Organization for Migration (IOM) and ACP Observatory on Migration (2014). Mobile Money Services: A banking your pocket. Overview and Opportunities. Background Note ACPOBS/2014/BN13. http://publications.iom.int/bookstore/free/Mobile_money.pdf.

ITU (2013). The Mobile Money Revolution. Part 2: Financial Inclusion Enabler. ITU-T Technology Watch Report.

Ivatury, G., & Mas, I. (2008). The early experience with branchless banking. CGAP Focus Note. Washington: CGAP.

Ivatury, G., & Pickens, M. (2006). Mobile phone banking and low-income customers: Evidence from South Africa. Washington, DC: Consultative group to assist the poor (CGAP) and the United Nations Foundation.

Jack, W., & Suri, T. (2011). Mobile Money: The Economics of M-PESA. NBER Working Paper Series 16721.

Jack, W., & Suri, T. (2014). Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution. *American Economic Review*, 104(1), 183-223.

Jambulingam, M. (2013). Behavioural Intention to Adopt Mobile Technology among Tertiary Students. *World Applied Sciences Journal*, 22(9), 1262-1271.

Jenkins, B. (2008). *Developing Mobile Money Ecosystems*. Washington, DC: IFC and the Harvard Kennedy School.

Johnson, S., & Nino-Zarazua, M.M. (2011). Financial Access and Exclusion in Kenya and Uganda. *Journal of Development Studies*, 47(3), 475-496.

Johnston, E.T. & McConnell, J.J. (1989). Requiem for a Market: An Analysis of the Rise and Fall of a Financial Futures Contract. *The Review of Financial Studies*, 2(1), 1-23.

JoyBusiness (2018). Mobile money deposits hit GH¢2.3 billion in 2017 – BOG. https://www.myjoyonline.com/business/2018/January-24th/mobile-money-deposits-hit-gh23-billion-in-2017-bog.php [Accessed: 14/3/2019].

Karahanna, E., Straub, D.W., & Chervany, N.L. (1999). Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly*, 23 (2), 183–213.

Karlan, D., & Zinman, J. (2010). Expanding Credit Access: Using Randomized Supply Decisions to Estimate the Impacts. *Review of Financial Studies*, 23, 433–64.

Katz, J. E., & Aspden, P. (1997). Motives, hurdles, and dropouts: Who is on and off the internet, and why. *Communications of the ACM*, 40(4), 97–102.

Kauffman, S., Lobo, J., & Macready, W.G. (2000). Optimal search on a technology landscape. *J. Econ. Behav. Organ.*, 43(2),141–166.

Kempson, E., & Whyley, C. (1999). Understanding and combating financial exclusion. Insurance Trends. *The Association of British Insurers*, 21, 18–22.

Khraim, H.S., Shoubaki, Y.E. & Khraim, A.S. (2011). Factors affecting Jordanian consumers' adoption of mobile banking services. *International Journal of Business and Social Science*, 2. 96-105.

Khraisha, T., & Arthur, K. (2018). Can we have a general theory of financial innovation processes? A conceptual review. *Financial Innovation*, 4(4), 1-27.

Kilara, T., & McKay, C. (2014). Advancing Financial Inclusion to improve the lives of the poor. *Consultative Group to Assist the Poor (CGAP).* Retrieved from http://www.cgap.org/topics/financial-inclusion.

Kim, C., Mirusmonov, M., & Lee, I. (2010). An Empirical Examination of Factors Influencing the Intention to Use Mobile Payment. *Computers in Human Behavior*, 26(3), 310-322.

Kim, G., Shin, B., & Lee, H.G. (2009). Understanding dynamics between initial trust and usage intentions of mobile banking. *Information Systems Journal*, 19(3), 283–311.

Kim, H-W., Chan, H.C., & Gupta, S. (2007). Value-Based Adoption of Mobile Internet: An Empirical Investigation. *Decision Support Systems*, 43(1), 111-126.

Kimuyu, P., & Omiti, J. (2000). Institutional Impediments to Access to Credit by Micro and Small-Scale Enterprise in Kenya. IPAR Discussion Paper No. 026/2000, Institute of Policy Analysis and Research.

King, N., & Horrocks, C. (2010). *Interviews in Qualitative Research*. London: Sage.

King, W.R., & He, J. (2006). A meta-analysis of technology acceptance model. *Inf. Manag.*, 43, 740–755.

Klein, M., & Mayer, C. (2011). Mobile Banking and Financial Inclusion: The Regulatory Lessons. The World Bank: Policy Research Working Paper 5664.

Kodom, K. (2013). *Savings Habit and Use of Savings among Households in Ga-East Municipality* (MPhil Thesis). Ghana: University of Ghana, Legon.

Koening-Lewis, N., Palmer, A., & Moll, A. (2010). Predicting young consumers' take up of mobile banking services. *International Journal of Banking Marketing, 28*(5), 410-432.

Kolodinsky, J., Hogarth, J.M., & Shue, J.F. (2000). Consumer adoption of electronic banking technologies. *Consumer Interests Annual*, 46, 180–184.

Korankye, K.A. (2018). Mobile money outstrips cheques in non-cash retail payments. Graphic Online Business New, Jun 22, 2018 publication. https://www.graphic.com.gh/business/business-news/mobile-money-outstrips-cheques-in-non-cash-retail-payments.html [Accessed: 12/1/19]

Kostov, P., Arun, T., & Annim, S. (2015). Access to financial services: the case of the 'Mzansi' account in South Africa. *Rev. Dev. Finance*, 5, 34–42.

Krugel, G. T. (2007). Mobile Banking Technology Options: An Overview of the different mobile banking technology options, and their impact on the mobile banking market. FinMark Trust. https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2012/06/finmark_mbt_aug_07.pdf [Accessed: 2/5/2018].

Kshetri, N., & Acharya, S. (2012). Mobile Payment in Emerging Markets. *IEEE IT Professional*, 14(4), 9-14.

Kusimba, S., Chaggar, H., Gross, E., & Kunyu, G. (2013). *Social networks of mobile money in Kenya* (Working Paper). Irvine, CA: University of California, Institute for Money, Technology and Financial Inclusion. Available at http://www.imtfi.uci.edu/files/2013-1_kusimba_1.pdf [Accessed: 2/5/2018].

Lal, R., & Sachdev, I. (2015). Mobile Money Services - Design and Development for Financial Inclusion. Working Paper 15-083.

Lee, M. (2009). Factors influencing the adoption of Internet banking: An integration of TAM and TPB with perceived risk and perceived benefit. *Journal of Electronic Commerce Research and Applications. Res (Appl)*, 130-141.

Lee, Y.H., Hsieh, Y.C., & Hsu, C.N. (2011). Adding Innovation Diffusion Theory to the Technology Acceptance Model: Supporting Employees' Intentions to use E-Learning Systems. *Educational Technology and Society*, 14(4), 124–137.

Lesitaokana, W. (2016). Influencing factors to mobile phone adoption among urban youth in Botswana. *Journal of Media and Communication Studies*, 8(1), 8-14.

Leung, L., & Wei, R. (2000). More than Just Talk on the Move: Uses and Gratifications of the Cellular Phone. *J. Mass Commun. Q.*, 77(2), 308- 320.

Levich, R.M. (1985). A View from the International Capital Markets. In I. Walter (ed.), *Deregulating Wall Street: Commercial Bank Penetration of the Corporate Securities Market* (pp. 255-292). New York: John Wiley Inc.

Levine, R. (1997). Financial development and economic growth: views and agenda. *J. Econ. Lit*, 35(2), 688–726.

Levine, R. (2005). Finance and growth: theory and evidence. In Aghion, P. and Durlauf, S.N. (Eds). *Handbook of Economic Growth*. Amsterdam: Elsevier Science.

Liebermann, Y., & Stashevsky, S. (2002). Perceived Risks as Barriers to Internet and E-Commerce usage. *Qualitative Market Research*, 5(4), 291-300.

Lihiku, N. G. (2006). *Determinants of savings in Malawi: a household level analysis*. Lilongwe: University of Malawi.

Ling, R., & Helmersen, P. (2000). It must be necessary, it has to cover a need: The adoption of mobile telephony among pre-adolescents. Paper presented at the Social Consequences of Mobile Telephony, Oslo, Norway.

Ling, R. (2004). *The Mobile Connection: The Cell Phone's Impact on Society*. Amsterdam: Morgan Kaufmann Publishers.

Loreto, F., Bagnoli, F., Calfapietra, C., Cafasso, D., De Lillis, M., Filibeck, G., Fineschi, S., Guidolotti, G., Sramkó, G., Tökölyi, J., & Ricotta, C. (2014). Isoprenoid emission inhygrophyte and xerophyte European woody flora: ecological and evolutionary implications. *Global Ecology and Biogeography*, 23, 334–345.

Lotto, J. (2018). Examination of the Status of Financial Inclusion and its Determinants in Tanzania. *Sustainability*, 10(2873), 1-15.

Lull, J. (2001). Super culture for the communication age. In: J. Lull (Ed.), *Culture in the communication age* (pp. 132-163). London: Routledge.

Lyman, T., Pickens, M., & Porteous, D. (2008). Regulating Transformational Branchless Banking: Mobile Phones and Other Technology to Increase Access to Finance [Focus Note 43]. Washington, DC: CGAP.

Macmillan, R., Paelo, A., & Paremoer, T. (2016). The 'evolution' of regulation in Uganda's mobile money sector. *The African Journal of Information and Communication (AJIC)*, 17, 89-110.

Maduku, D.K. (2013). Predicting retail banking customers' attitude towards Internet banking in South Africa. *Southern Africa Business Review*, 17 (3), 96-100.

Makosana, M. (2014). Customers' adoption of electronic banking: An investigation on the commercial banking industry in Zimbabwe. *International Journal of Economics, Commerce and Management United Kingdom*, 1(7), 1-13.

Malhotra, Y., & Galletta, D. F. (1999). Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation. Proceedings of the 32nd Hawaii International Conference on System Sciences.

Malinga, R.B., & Maiga, G. (2020). A model for mobile money services adoption by traders in Uganda. *The Electronic Journal of Information Systems Developing Countries*, 86: 1 – 14.

Mas, I., & Morawczynski, O. (2009). Designing Mobile Money Services: Lessons from M-PESA. *Innovations*, 4(2), 77-92. MIT Press. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1552753.

Mas, I., & Radcliffe, D. (2010). Mobile Payments go viral: *M-PESA in Kenya*. Bill and Melinda Gates foundation.

Mathenge, W. G. (2007). Financial Regulatory Structure Reform in Kenya: The Perception of Financial Intermediaries in Kenya Regarding. The Case for a Single Financial Regulator. University of Nairobi. Retrieved from http://www.erepository.uonbi.ac.ke.

Mattern, M. (2018). How Ghana Became One of Africa's Top Mobile Money Markets. CGAP. https://www.cgap.org/blog/how-ghana-became-one-africas-top-mobile-money-markets [Accessed: 21/3/2019].

Maurer, B. (2012). Mobile money: communication, consumption and change in the payments space. *Journal of Development studies*, *48*(5), 589-604.

Mayring, P. (2014). Qualitative content analysis: theoretical foundation, basic procedures and software solution. Klagenfurt. Available at: http://nbn-resolving.de/urn:nbn:de:0168-ssoar-395173 [Accessed: 12/4/2018].

Mazer, R., & Rowan, P. (2016). Competition in Mobile Financial Services: Lessons from Kenya and Tanzania. *The African Journal of Information and Communication*, 17(17), 39–59.

Mbithi, I., & Weil, D. N. (2014). *Mobile banking: the impact of M-PESA in Kenya*. National Bureau of Economic Research Working paper No: 17129.

McKay, C., & Kaffenberger, M. (2013). Rural versus urban mobile money use: Insights from demand-side data. Consultative Group to Assist the Poor. Retrieved from http://www.cgap.org/blog/rural-vs-urban-mobile-money-use-insights-demand-side-data [Accessed: 23/6/2018].

McKay, C., & Pickens, M. (2010). *Branchless Banking 2010: Who"s Served? At What Price? What"s Next?* (Vol. 66). CGAP Focus Note.

Mention, A.L., & Torkkeli, M. (2014). *Innovation in Financial Services: A Dual Ambiguity*. London: Cambridge Scholars Publishing.

Merton, R.C. (1992). Financial innovation and economic performance. *Journal of applied corporate finance*, 4(4), 12–22.

Ministry of Finance and Economic Development Planning (2014). National Financial Inclusion Strategy (NFIS) 2015-2020, Burundi. Available at https://www.afi-

global.org/sites/default/files/publications/nfis-english_version_final.pdf [Accessed: 6/4/18].

Miyaki, Y. (2006). Keitai Use among Japanese Elementary and Junior High School Students. In: M. Ito, D. Okabe, and M. Matsuda (Eds.), *Personal, Portable, Pedestrian: Mobile Phones in Jpn. Life*. pp. 277- 299. London: The MIT Press.

Mlachila, M., Dykes, D., Zajc, S., Aithnard, P.-H., Beck, T., Ncube, M., & Nelvin, O. (2013). Banking in Sub-Saharan Africa: Challenges and Opportunities. The European Investment Bank.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Inforn. Systems Res*., 2, 192-222.

Morawczynski, O. (2008). Surviving in the dual system: How M-Pese is Fostering urban-to-rural remittances in a Kenyan Slum. Proceedings of the IFIP WG, 9, 110-127.

Morawczynski, O. (2009). Exploring the usage and impact of transformational mobile financial services: the case of M-PESE in Kenya. *Journal of Eastern African studies*, *3*(3), 509-525.

Morawczynski, O., & Pickens, M. (2009). Poor people using mobile financial services: observations on customer usage and impact from M-PESA. CGAP. http://www.cgap.org/gm/document1.9.36723/BR_Poor_People_Using_Mobile_Financial_Services.pdf [Accessed: 6/4/18].

Morris, M.G., & Venkatesh, V. (2000). Age Differences in Technology Adoption Decisions: Implications for a Changing Workforce. *Personnel Psychology*, 53, 375-403.

Morse, J. M. & Niehaus, L. (2016). *Mixed Method Design: Principles and Procedures*. London and New York: Routledge, Taylor and Francis Group.

Moss, F. (2013). Keynote speech on the importance of financial inclusion in the light of the recent financial crisis. Frankfurt: Frankfurt School of Finance and Management and Alliance for Financial Inclusion.

Mukhongo, W. (2014). *Determinants of Rural Household Savings in Bungoma County - Kenya*. Nairobi: Kenyatta University.

Mukindia, S.M. (2012). *Influence of socio-cultural factors on households savings among Maasai Community in Transmara District, Narok County*. Nairobi: University of Nairobi.

Mulino, F.R.D., & Chai, D. (2008). On the linkage between financial risk tolerance and risk aversion. *Journal of Financial Research*, 31(1), 1-23.

Munyanyi, W. (2014). 'Banking the Unbanked': Is Financial Inclusion Powered by Ecocash a Veracity in Rural Zimbabwe? *Greener Journal of Banking and Finance*, 1, 1-9.

Munyegera, G.K. & Matsumoto, T. (2018). ICT for financial access: Mobile money and the financial behavior of rural households in Uganda. *Rev Dev Econ*. 22, 45–66.

Munyegera, G. K., & Matsumoto, T. (2016). Mobile money, remittances, and household welfare: Panel evidence from rural Uganda. *World Development*, 79, 127– 137.

Munyegera, G.K., & Matsumoto, T. (2014). Mobile Money, Remittances and Rural Household Welfare: Panel Evidence from Uganda. *GRIPS Discussion Paper*, 14 – 22.

Must, B., & Ludewig, K. (2010). Mobile Money: Cell Phone Banking in Developing Countries. *Policy matters Journal*, 7(2), 27-33.

National Communication Authority (2017). Mobile Telephone Subscriptions in Ghana from 1992 to April 2017. https://www.nca.org.gh/assets/Uploads/Historical-Voice-SubscriptionFigures-1992-April-2017.pdf [Accessed: 11/2/2019].

Newby, P. (2014). *Research methods for education* (2nd ed). New York: Routledge.

Njunge, P. M. (2013). Gender and Household Savings Behavior in Kenya. Nairobi: University of Nairobi.

Nysveen, H., Pedersen, P.E., & Thorbornsen, H., (2005). Explaining intention to use mobile chat services: moderating effects of gender. *Journal of consumer Marketing*, 22 (5), 247-256.

Ofei, A. K. (2004). Terms and Access to Credit Perceptions of SMES Entrepreneurs in Ghana. Paper Presented at the International Conference on Ghana at the Half Century, July 18, Organized by ISSER, University of Ghana and Cornell University, Accra.

Ofoeda, I. Gariba, P., & Amoah, L. (2016). Regulation and performance of non-bank financial institutions in Ghana. *International Journal of Law and Management*, 58(1), 108-125. https://doi.org/10.1108/IJLMA-11-2014-0060.

Ofoeda, I., Abor, J., & Adjasi, C.K.D. (2012). Non-bank financial institutions regulation and risk-taking. *Journal of Financial Regulation and Compliance*, 20(4), 433-450.

Oliveira, T., Thomas, M.A., Baptista, G., & Campos, F. (2016). Mobile payment: Understanding the determinants of customer adoption and intention to recommend the technology. *Computers in Human Behavior*, 61, 404-414.

Olushola, T., & Abiola, J. O. (2017). The Efficacy of Technology Acceptance Model: A Review of Applicable Theoretical Models in Information Technology Researches. *Journal of Research in Business and Management*, 4(11), 70-83.

Onyia, O.P., & Tagg, S.K. (2011). Effects of demographic factors on bank customers' attitudes and intention toward Internet banking adoption in a major developing African country. *Journal of Financial Services Marketing*, 16(3/4), 294–315.

Orgard, S. (2005). Internet behaviour and the design of virtual methods. In: C. Hine (ed). *Virtual methods: Issues in Social Research on the Internet* (pp. 51-65). Oxford: Oxford University Press.

Osei-Assibey, E. (2015). What drives behavioral intention of mobile money adoption? The case of ancient susu saving operations in Ghana. *International Journal of Social Economics*, 42(11), 962 – 979.

Osei-Boateng, C. & Ampratwum, E. (2011). The Informal Sector in Ghana. Friedrich Ebert Stiftung.

Otieno, O.C., & Liyala, S. (2018). Mobile Money Users' Functionings and Freedoms: Amartya Sen's Capability Approach. *World Journal of Computer Application and Technology*, 6(1), 14-22.

Ouma, S. A., Odongo, T. M., & Were, M. (2017). Mobile financial services and financial inclusion: Is it a boon for savings mobilization? *Review of Development Finance*, 7, 29–35.

Padashetty, S., & Krishna, S. V. (2013). An empirical study on consumer adoption of mobile payments in Bangalore city: A case study. *International Journal of Arts, Science and Commerce*, 4, 54-57.

Pagani, M. (2004). Determinants of adoption of third generation mobile multimedia services. *J. Interact. Mark.*, 18(3), 46-59.

Park, S. Y. (2009). An Analysis of the Technology Acceptance Model in Understanding University Students' Behavioral Intention to Use e-Learning. *Educational Technology and Society*, *12* (3), 150–162.

Peters, O., & Allouch, S.B. (2005). Always connected: a longitudinal field study of mobile communication. *Telematics Inform*. 22(3), 239-256.

Pham, T. T., & Ho, J. C. (2015). The effects of product-related, personal-related factors and attractiveness of alternatives on consumer adoption of NFC-based mobile payments. *Technology in Society*, 4, 1-16.

Plyler, M.G., Haas, S., & Nagarajan, G. (2010). Community-Level Economic Effects of M-PESA in Kenya: Initial Findings. The Financial Services Assessment project. Available at http://www.findevgateway.org/sites/default/files/mfg-en-case-study-community-level-economic-effects-of-m-pesa-in-kenya-initial-findings-jun-2010.pdf. [Accessed: 12/3/18].

Poole, M.S., & Van de Ven, A.H. (1995) Explaining development and change in organizations. *Acad Manag Rev*., 20(3), 510–540.

Poole, M.S., & Van de Ven, A.H. (1989). Toward a general theory of innovation processes. Research on the management of innovation: *The Minnesota studies*, 637 – 662.

Porteous, D. (2006). *The enabling environment for mobile banking in Africa*. Department for International Development. Retrieved from http://www.ruralfinance.org/discussion/ru/?no_cache=1&srec=11508&tdet=training&tdet2=&tdet3=2&referer=MTA1Mjk%3D [Accessed: 17/5/2018].

Porteous, D. (2009). Key Issues in Design and Implementation of Surveys on Financial Inclusion Presented at the Alliance for Financial Inclusion Global Policy Forum. Nairobi, September 15. Available at www.afi-global.net/downloads/GPF_David_Porteous.pdf [Accessed: 17/5/2018].

Porter, C.E. & Donthu, N. (2006). Using the Technology Acceptance Model to Explain How Attitudes Determine Internet Usage. *Journal of Business Research*, 59(9), 999-1007.

Poutanen, P., Siira, K., & Aula, P. (2016). Complexity and Organizational Communication: A Quest for Common Ground. *Human Resource Development Review*, 15(2), 182–207.

Presbitero, A. F., Rabellotti, R., & Piras, C. (2014). Barking up the Wrong Tree? Measuring Gender Gaps in Firm's Access to Finance. *The Journal of Development Studies*, 50(10), 1430-1444.

Quisumbing, A., & Maluccio, J. (1999). Intra-household Allocation and Gender Relations: New Empirical Evidence. Gender and Development Working Paper Series, No. 2, World Bank, Washington, D.C.

Rajan, R. (2014). Financial inclusion - Technology, Institutions and Policies. Reserve Bank of India. https://www.bis.org/review/r140212d.pdf [Accessed: 13/6/2018].

Rhee, K., & Kim, W. (2004). The adoption and use of the Internet in South Korea. *Journal of Computer-Mediated Communication (JCMC)*, 9(4). Available online at: https://doi.org/10.1111/j.1083-6101.2004.tb00299.x [Accessed: 12/6/2018].

Riddell, W.C., & Song, X. (2017). The Role of Education in Technology Use and Adoption: Evidence from the Canadian Workplace and Employee Survey. *ILR Review*, 70(5), 1219–1253.

Riley, T. A., & Kulathunga, A. (2017). *Bringing E-money to the Poor: Successes and Failures*. Directions in Development- Finance. Washington DC: World Bank.

Riquelme, H. E., & Rios, R. E. (2010). The moderating effect of gender in the adoption of mobile banking. *International Journal of Bank Marketing*, 28, 328-341.

Roberts, G.K., & Pick, J.B. (2008). Technology Factors in Corporate Adoption of Mobile Cell Phones: A Case Study Analysis. Paper presented at the Hawaii International Conference on System Sciences Big Island, Hawaii.

Rogers, E.M. (1995). *Diffusion of innovations* (4th edition). New York: The Free Press.

Ross, S.A. (1989). Institutional markets, financial marketing, and financial innovation. *Journal of Finance*, 44(3), 541–556.

Rutherford, S. (2003). Money talks: conversations with poor people in Bangladesh about managing money. *J. Microfinance*, 5(2), 43–75.

Sahay, R., Čihák, M., N'Diaye, P., Barajas, A., Mitra, S., Kyobe, A., Mooi, Y. N., & Yousefi, S. R. (2015). Financial Inclusion: Can It Meet Multiple Macroeconomic Goals? IMF Staff Discussion Note, SDN/15/17.

Sahrawat, R. (2010). Financial Inclusion from Obligation to Opportunity. Tata Consultancy Service Ltd.

Saliu, I. (2015). *Assessing the Impact of Mobile Money Transfer Service on the Socioeconomic Status of the Mobile Money Vendors: Case of Kumasi Metropolis*. Kumasi, Ghana: Kwame Nkrumah University of Science and Technology.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th ed). England: Pearson Education Limited.

Schepers, J. & Wetzels, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Inf. Manag.*, 44, 90–103.

Seale, C. (ed.) (2004). *Social Research Methods: A Reader*. UK: Routledge.

Sedzro, A. (2013). Mobile Money: Ghana's Experience. Retrieved from http://tonywelcomes.blogspot.com/2013/04/mobile-money-ghanas-experience.html [Accessed: 3/6/18].

Sekhar, G.V.S. (2018). *Financial Innovation: Theories, Models and Regulation*. United States: Vernon Press.

Sereetraku, W., Wongveeravuti, S., & Likitapiwat, T. (2013). Gender Differences in Saving and Spending Behaviours of Thai Students. *Research in Education*, 90, 68-81.

Serrao, M.V., Sequeira, A.H., & Hans, B. (2012). Designing a Methodology to Investigate Accessibility and Impact of Financial Inclusion. Available at http://dx.doi.org/10.2139/ssrn.2025521 [Accessed: 23/4/18].

Shem, A.O., Misati, R., & Njoroge, L. (2012). Factors driving usage of financial services from different financial access strands in Kenya. *Sav. Dev.*, 36 (1), 71-89.

Shin, D. H. (2009). Towards an understanding of the consumer acceptance of mobile wallet. *Computers in Human Behaviour, 25,* 1343-1354.

Siddik, N.A., Sun, G.S., Yanjuan, C.U.I., & Kabiraj, S. (2014). Financial Inclusion through Mobile Banking: A Case of Bangladesh. *Journal of Applied Finance andBanking*, 4(6), 09-136.

Silber, W.L. (1975). *Financial innovation*. Lexington Books.

Silber, W.L. (1983). The process of financial innovation. *Am Econ Rev*., 73(2), 89 – 95.

Sim, J.J, Tan, G.W.H., Ooi, K.B., & Lee, V.H. (2011). Exploring the individual characteristics on the adoption of broadband: An empirical studies. *International Journal of Networking and Mobile Technology*, 2(1), 1-4.

Singh, A.M. (2004). Trends in South African Internet banking. *Aslib Proceedings: New Information Perspectives*, 56(3), 187–196.

Smith, C.W., Smithson, C.W., & Wilford, D.S. (1990). *Managing financial risk*. New York: Harper and Row.

Spong, K. (2000). Banking regulation: its purpose, implementation and effects (5th edition). Division of Supervision and Risk Management. Federal Reserve Bank of Kansas City Working Paper 05/06.

Stange, K. C. (2006). Publishing multimethod research. *Annals of Family Medicine*, 4(4), 292-294.

Staschen, S. (2018). Bank-Led Digital Finance: Who's Really Leading? CGAP Focus Note. https://www.cgap.org/blog/bank-led-digital-finance-whos-really-leading [Accessed: 16/9/2018].

Stavins, J. (2001). Effect of Consumer Characteristics on the Use of Payment Instruments. *New England Economic Review*, (3), 19–31.

Steel, W.F., & Andah. D.O. (2003). Rural and microfinance regulation in Ghana: Implications for development and performance of the industry. World Bank. Africa Region Working Paper Series No. 49.

Straub, E. T. (2009). Understanding Technology Adoption: Theory and Future Directions for Informal Learning. *Review of Educational Research*, 2, 625–649.

Suárez, S. L. (2016). Poor people's money: The politics of mobile money in Mexico and Kenya. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2821072 [Accessed: 12/2/2019].

Sujeet, K.S. & Jyoti, K.C. (2013). Technology acceptance model for the use of learning through websites among students in Oman. *International Arab Journal of E-Technology*, 3(1), 44–49.

Tanakinjal, G.H., Deans, K.R., & Gray, B.J. (2010). Innovation Characteristics, Perceived Risk, Permissibility and Trustworthiness in the Adoption of Mobile Marketing. *Journal of Convergence Information Technology*, 5(2), 112-123.

Tanzania Communications Regulation Authority (TCRA) (2013). Tanzania Communications Regulatory Authority: Quarterly Telecom Statistics. http://www.tcra.go.tz/images/documents/telecomStatsJune13.pdf [Accessed: 8/5/18].

Tanzania National Council for Financial Inclusion (n.d). National Financial Inclusion Framework. Available at https://www.afi-global.org/sites/default/files/publications/tanzania-national-financial-inclusion-framework-2014-2016.pdf.

Tashakkori, A., & Teddlie, C. (2003). *Handbook of Mixed Methods in Social and Behavioral Research*. Thousand Oaks: Sage.

Teo, T.S.H., & Pok, S.H. (2003). Adoption of WAP-enabled mobile phones among Internet users. *Omega*, 31(6), 483-498.

Thorat, U. (2006). Financial Inclusion and Millennium Development Goals, Economic developments in India: Analysis, Reports, Policy Documents. New Delhi. *Academic Foundation's continuing series*, 31-39.

Tobbin, P. (2012). Towards a model of adoption in mobile banking by the unbanked: A Qualitative Study. *Information*, 14(5), 74-88.

Triki, T., & Faye, I. (Eds.) (2013). *Financial Inclusion in Africa*. Tunisia: African Development Bank (AfDB).

Tuesta, D.; Sorensen, G.; Haring, A., & Camara, N. (2015). Financial Inclusion and Its Determinants: The Case of Argentina. BBVA Working Paper No. 1503. 2015. https://www.bbvaresearch.com/wp-content/uploads/2015/01/WP_15-03_Financial-Inclusion-in-Argentina.pdf [Accessed: 12/7/18].

Tufano, P. (2003). Financial innovation. In: G. Constantinides, M. Harris, and R. Stultz (eds), *Handbook of the economics of finance* (pp. 307 – 335). Amsterdam: Elsevier.

UNDP & UNIFEM.(2005). Needs Assessment of the Millennium Development Goal 3 on Gender Equality and Women Empowerment-Kenya. Available at http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUImages/MDGpdf/$file/MDG-3-E.pdf [Accessed: 4/7/18].

USAID (2011). Better than cash: Kenya Mobile Money Market Assessment. https://solutionscenter.nethope.org/assets/collaterals/Kenya-Mobile-Money-Assessment.pdf [Accessed: 5/6/19].

Van Biljon, J., & Kotze, P. (2008). Cultural Factors in a Mobile Phone Adoption and Usage Model. *J. Univers. Comput. Sci*., 14(16), 2659- 2679.

Varshney, U., & Vetter, R. (2002). Mobile commerce: Framework, applications and networking support. *Mobile Networks and Applications*, 7, 185-198.

Venkatesh, V., & Morris, M.G (2000). Why do not men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly*, 24 (1), 115–139.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, *39*(2), 273-315.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*, 425–478.

Verghese, S.K. (1990). Financial Innovation and Lessons for India. Special articles, Economic and Political weekly. *Economics*, 25, 213-240.

Viscusi, W.K., Vernon, J.M., & Harrington, J.E.J. (2005). *Economics of regulation and antitrust* (4th Edition). Cambridge, MA: MIT Press.

Wan, W.W., Luk, C.-L., & Chow, C.W.C. (2005). Customers' adoption of banking channels in Hong Kong. *International Journal of Bank Marketing*, 23(3), 255-272.

Wang, K., Chen, G., & Chen, H. (2017). A model of technology adoption by older adults. *Social Behavior and Personality: An international journal*, *45*, 563-572.

Weijters, B., Rangarajan, D., Falk, T., & Schillewaert, N. (2007). Determinants and outcomes of customer use of self-service technology in a retail setting. *J. Serv. Res*., 10(1), 3-21.

Wilde, J. (2000). Identification of multiple equation probit models with endogenous dummy regressors. *Econom. Lett*., 69, 309–312.

Williams, H., & Torma, M. (2007). Trust and Fidelity: From 'under the mattress' to the mobile phone. Moving the debate forward. *The Policy paper series*, *No. 6*.

Willig, C. (2008). *Introducing Qualitative Research in Psychology: adventures in theory and method* (2nd edition). Buckingham: Open University Press.

Wilson, K., Harper, M., & Griffith, M. (2010). *Financial Promise for the Poor: How Groups Build Micro savings*. Sterling, VA: Kumarian.

Wolman, D. (2012). *The End of Money*. Cambridge, Massachusetts: De Capo Press.

Wood, S. L., & Swait, J. (2002). Psychological indicators of innovation adoption: Cross-classification based on need for cognition and need for change. *Journal of Consumer Psychology*, *12*, 1–13.

World Bank (2013). Universal Financial Access Is Vital to Reducing Poverty. Innovation Key to Overcoming the Enormous Challenge. Press release. Available at http://www.worldbank.org/en/news/press-release/2013/10/11/universal-financial-access-vital-reducing-povertyinnovation-jim-yong-kim [Accessed: 12/2/2019].

World Bank (2014). *Global Financial Development Report 2014: Financial Inclusion.* Washington, DC: World Bank.

World Bank (2017). Money Within Reach: Extending Financial Inclusion in Tanzania. Tanzania Economic Update. The World Bank Group. Africa Region Macroeconomics and Fiscal Management Global Practice Issue 9.

Yankson, P. W. K., & Bertrand, M. (2012). Challenges of Urbanization in Ghana. In: E. Ardayfio-Schandorf, P.W.K. Yankson, and M. Bertrand (eds.), *The Mobile City of Accra: Urban Families, Housing and Residential Practices* (pp.25 – 46). Senegal: CODESRIA.

Yi, Y. D., Wu, Z., & Tung, L.L. (2005). How individual differences influence technology usage behaviour. Toward an integrated framework. *Journal of Computer Information Systems* 46 (2), 52–63.

Zhou, T. (2011). Examining mobile banking user adoption from the perspectives of trust and flow experience. *Information Technology and Management*, *13*(1), 27–37.

Zimmerman, J. M., & Banerjee, S. S. (2009). Promoting Savings as a Tool for International Development. Spotlight on WOCCU's MatchSavings.org. Washington D.C. New American Foundation. Available at https://static.newamerica.org/attachments/8315-taking-cash-on-delivery-aid-one-step-further-with-financial-inclusion/MatchedSavingsIssueBriefFINAL.c78f94810bb54fd69377b7ca373450b6.pdf [Accessed: 23/10/17].

Zins, A., & Weill, L. (2016). The determinants of financial inclusion in Africa. *Review of Development Finance*, 6, 46–57.

Appendices

Appendix 1: Reasons for Adopting Mobile Money

Uses	%	Age Groups				Locality		
		Youth	Adult	Aged	χ^2	Urban	Rural	χ^2
Transferred money to family/ friend	58.4	59.5	59	50	10.4**	62	53	25.9***
Received money from family/ friend	86.6	87.2	85.8	86.4	1.23	87	86	0.14
Transferred money to a business partner	20.5	19.8	23.9	9.9	32.3***	22	18	8.5**
Received money from a business partner	25.9	25.1	29.8	14.5	33.1***	28	22	13.6***
Pay bills	2.67	3.1	2.1	2.8	2.78	3	2	0.49
Make Purchases	20.8	26.9	15	12.7	78.4***	24	15	43.8***
Savings	48.7	55.1	44.6	32.4	70.8***	50	65	5.2*

* p<0.05, ** p<0.01, *** p<0.001

Appendix 2: Reasons for Non-Adoption of Mobile Money

	Overall	Urban	Rural	Chi
I don't trust it	6.6	7.6	5.6	2.87
The charges are too high	6.3	6.6	6	0.26
I don't have any use for it	43.7	46.1	41.2	4.6*
I am not aware of it	4.8	1.8	8.0	40.3***
I am studying it further before I make a decision in the future	20.6	19.2	22.1	2.33
Fear of mobile phone theft	4.8	3.9	5.7	3.27

Appendix 3: Ghana's Financial Inclusion Performance 2011 – 2017

	Ghana	Sub-Saharan Africa
Account (% age 15+)		
2011	29.4	23.2
2014	40.5	34.2
2017	57.7	42.6
Financial institution account (% age 15+)		
2011	29.4	23.2
2014	34.6	28.8
2017	42.3	32.8
Mobile money account (% age 15+)		
2011*	3	-
2014	13	11.6
2017	38.9	20.9

Freq.: 1000/year Source: Findex Survey, 2011 – 2017

Appendix 4: Survey Questionnaire

Tick only one box unless 'multiple response' indicated

GENERAL SURVEY DATA

1. Serial Number:
2. Date of interview:
3. Name of Enumeration Area:
4. Name of District:
5. Name of Region:
6. Type of area (rural/urban)

Section 1: Household Roster and Individual Information

Background Information - *(To be asked about all household members 13 years and above)*

ID	Name of Household Member	1. Sex 1. Male 2. Female	2. What is [Name's] relationship with the Head of the Household? (See code1)	3. How old is (Name)? (age in years)	4a. What is the highest educational qualification of [NAME]? 1. No Education 2. Basic 3. Secondary 4. Tertiary	4. Does (Name) own a mobile phone Yes=1 No=0, If no skip qn 5	5. If yes, what network does [Name] usually use? (See Code 2)
1		/_____/	/_____/				/_____/
2		/_____/	/_____/				/_____/
3		/_____/	/_____/				/_____/
4		/_____/	/_____/				/_____/
5		/_____/	/_____/				/_____/
6		/_____/	/_____/				/_____/
7		/_____/	/_____/				/_____/
8		/_____/	/_____/				/_____/
9		/_____/	/_____/				/_____/
10		/_____/	/_____/				/_____/
11		/_____/	/_____/				/_____/
12		/_____/	/_____/				/_____/

Code 1
1. Head - HH
2. Spouse - SH
3. Child - CH
4. Grandchild - GH
5. Parent/Parent-in-law - PI
6. Son/Daughter-in-law - CI
7. Other relative - OR
8. Adopted/Foster/Stepchild – AD
9. House help - HS
10. Non-relative – NR

Code 2 for qn 5
1. Vodafone
2. TIGO
3. MTN
4. Airtel
5. Expresso
6. GLO
7. Zipnet
8. Busy
9. Surfline
10. Blu
11. Other (spiffy ……..
12. Don't know

Section 2 USE OF MOBILE MONEY SERVICE

	Yes	No
1. Do you have a registered mobile money account?		
IF NO, GO TO 3		
2. If yes, which network are you registered with?		
1.MTN		
2.Airtel		
3.Tigo		
4.Vodafone		

	1.Yes	2.No
3. Have you used any **mobile money transfers** in the last 12 months?		
IF NO, GO TO 11		

	1.Year	2.Month
4. How long have you been using mobile money?		

	1.1-3 times	2.4-6 times	3.6-9 times	4.10 or more	5.Never
5. How many times did you **receive** money via the mobile money during the last 12 months?					
6. How many times did you **send** money via the mobile money during the last 12 months?					

	1. Yes	2.No
7. Which of the following did you consider before making the decision to use mobile money?		
a. I perceived it to be useful to me		
b. It is easy to use		
c. It is cheaper		
d.Transaction through mobile money is quicker		
e.It is convenient		
f.It is available almost everywhere		
g.Everyone around me / people I trade with use it		
h.I trust the operators (network service providers)		
i. Other, specify		

	Yes	No
8. Using **mobile money transfers**, have you done any of the following in the last 12 months?		
a. Transferred money from your account to family/friend		
b. Transferred money from your account to a business partner		
c. Received money from family/friend		
d. Received money from a business partner		
e. Pay bills		
f. Make purchases		
g. Savings		

	1.Yes	2.No
9. Have you encountered any challenges since you started using mobile money?		
IF N0, GO TO 12		
10. If yes, which of the following did you encounter? Answer and SKIP To Q124		

	1.Yes	2.No
a.Network failures		
b.High charges		
c. Difficulty using the application		
d.Long distance to vendors		
e.Other, specify		

11. Why are you not using it?

	1.Yes	2.No
a.I don't trust it		
b.The charges are too high		
c.I don't have any use for it		
d.I am not aware of it		
e.I am studying it further before I make a decision in the future		
f.Fear of mobile phone theft		
g.Other, specify		

Appendix 5: Interview Guides

Interview Guide for Bank of Ghana (Regulator)

Introduction

Mobile money adoption has been increasing since its inception in Ghana in 2009. Despite the adoption rate, available data shows that the rate of adoption among people within the middle to high income category is relatively higher than those in the lower income category. In the 2008 Bank of Ghana regulation on branchless banking, Mobile Money was recognized as a service with the potential to drive financial inclusion in Ghana. The purpose of this interview is to find out the role that regulation plays in facilitating or limiting financial inclusion through mobile money in Ghana.

1. To what extent does regulation promote or restrain the growth of mobile money services?

Financial Inclusion

2. How does Bank of Ghana define financial inclusion?

3. What programs are BoG currently undertaking to promote financial inclusion? How are they different from what was done in the past?

4. How does mobile phone technology serve as a vehicle to achieving financial inclusion in Ghana? (Please explain your answer)

Role of Central Bank regulation in facilitating financial inclusion in Ghana

5. Unlike countries like Kenya, Zimbabwe and the Philippines who adopted a 'test and learn approach' to regulating mobile money, Ghana adopted a regulatory-led approach to mobile money. Why the choice of the regulatory-led approach and not the vice versa?

6. How have regulations on mobile money evolved (timelines). What precipitated these changes?

7. To what extent do the current regulations on mobile money limit the financial services that can be provided through mobile money?

8. We know that mobile money started as a service that enabled users to just transfer money. When and how did Central Bank regulations enable mobile money users to:
    a. save and earn interest on their savings? (at what point did the float become considered as 'savings'? how much interest does one earn?)
    b. access credit through their mobile money account

[Probe for factors that precipitated all these changes]

9. How effective are the regulations in preventing abuses of the mobile money system?

Shortfalls in BoG regulations for mobile money

10. Are there any general shortfalls in the current BoG regulations that you have identified? (state and explain if any)

11. Particular to mobile money serving as a vehicle for people to save and borrow (financial inclusion), what lapses have you have identified with the current regulations?

12. Are there any measures that are currently being undertaken by BoG to develop mobile money services to enable its users to access credit and insurance through mobile money rather than directly from banks and insurance companies?

Characteristics of Respondent

Gender, Level of educational attainment, Department of work, Position within Department/Institution, Years of Experience

Interview Guide for Telecommunication Companies (Providers)

Introduction

Mobile money adoption has been increasing since its inception in Ghana in 2009. In the 2008 Bank of Ghana regulations on branchless banking, Mobile Money was recognized as a service with the potential to drive financial inclusion in Ghana. Despite

the increasing rate of adoption, data shows that the rate of adoption among people within the middle to high income category is relatively higher than those in the lower income category. The purpose of this interview is to find out the role that regulation plays in facilitating financial inclusion or limiting through mobile money in Ghana.

1. To what extent does regulation promote or restrain the growth of mobile money services?

2. As a provider of mobile money services, to what extent do you consider mobile money as an effective vehicle to providing the lower-income, unbanked population with basic financial services in Ghana? (Probe for reasons)

Role of Regulations in facilitating financial inclusion in Ghana

1. Aside from the Bank of Ghana regulations, are there any other regulations governing mobile money operation in Ghana? (if there is, what is it, since when was it made, what does it basically say).

2. How has regulation of mobile money evolved (timelines). What precipitated these changes?

3. Unlike countries like Kenya, Zimbabwe and the Philippines who adopted a 'test and learn approach' to regulating mobile money, Ghana adopted a restrictive regulatory-led approach to mobile money. To what extent do you consider this approach as appropriate or inappropriate for mobile money penetration in Ghana?

4. BoG for instance revised its earlier regulations on mobile money in 2015.
    a. What does the current regulations permit you to do in your mobile money operation?
    b. What restrictions on mobile money operation do the current regulations pose on you?

5. We know that mobile money started as a service that enabled users to just transfer money. What convinced the Central Bank to subsequently modify regulations to enable mobile money users to:
    a. save and earn interest on their savings?
    b. access credit through their mobile money account

    [*Probe for factors that precipitated all these changes*]

6. How effective are the regulations in preventing abuses within the mobile money service?

7. Are there any services you wish to provide through mobile money but are restricted through the Central Bank regulations?

8. Do you think the requirements within the regulations (specific emphasis on BoG regulations) creates the enabling environment for the providers of Mobile Money to develop innovative services to reach the financial needs of Ghanaians, especially the poor (*financial needs = transfers, savings, credit & insurance through mobile money*)?

Regulatory Challenges

9. Are there any general shortfalls in the current BoG regulations that you have identified? (state and explain if any)

10. What changes in regulations will help you to reach the financial needs of Ghanaians?

11. To what extent do you consider the regulatory framework as preventing you from being innovative

12. What regulatory changes will you recommend to enable mobile money to reach more poor people in Ghana?

13. What changes will drive more financial services to be provided through mobile money?

Characteristics of Respondent

i. Gender
ii. Level of educational attainment
iii. Organization
iv. Department of work
v. Position within Department/Institution
vi. Years of Experience

Interview Guide for other regulating bodies

Introduction

Mobile money adoption has been increasing since its inception in Ghana in 2009. In the 2008 Bank of Ghana regulations on branchless banking, Mobile Money was recognized as a service with the potential to drive financial inclusion in Ghana. Despite the increasing rate of adoption, data shows that the rate of adoption among people within the middle to high income category is relatively higher than those in the lower income category. The purpose of this interview is to find out the role that regulation plays in facilitating financial inclusion or limiting through mobile money in Ghana.

3. What is the main function of (Chambers of Telecommunication/NCA/GhIPSS)

4. What role does GCT play in the mobile money ecosystem?

5. To what extent does regulation promote or restrain the growth of mobile money services?

6. To what extent do you consider mobile money as an effective vehicle to providing the lower-income, unbanked population with basic financial services in Ghana? (Probe for reasons).

Role of Regulations in facilitating financial inclusion in Ghana

7. Aside from the Bank of Ghana regulations, are there any other regulations governing mobile money operation in Ghana? (if there is, what is it, since when was it made, what does it basically say).

8. Unlike countries like Kenya, Zimbabwe and the Philippines who adopted a 'test and learn approach' to regulating mobile money, Ghana adopted a restrictive regulatory-led approach to mobile money. To what extent do you consider this approach as appropriate or inappropriate for mobile money penetration in Ghana?

9. How effective are the regulations in preventing abuses within the mobile money service?

10. Do you think the requirements within the regulations (specific emphasis on BoG regulations) creates the enabling environment for the providers of Mobile Money to develop innovative services to reach the financial needs of Ghanaians, especially the poor (*financial needs = transfers, savings, credit & insurance through mobile money*)?

11. How do you see the potential of the recent interoperability in expanding mobile financial inclusion in Ghana?

Mobile Money Issues from MNOs

12. What issues do the MNOs usually bring out that concerns their mobile money operation? (probe for issues concerning regulatory restrictions, dos and don'ts)

13. As an industry body, how do you handle these issues?

Regulatory Challenges

14. Are there any general shortfalls in the current BoG regulations that you have identified? (state and explain if any)

15. What changes in regulations will help to reach the financial needs of Ghanaians, especially the excluded through mobile money?

16. To what extent do you consider the regulatory framework as preventing providers from being innovative

17. What changes will drive more financial services to be provided through mobile money?

Characteristics of Respondent

i. Gender
ii. Level of educational attainment
iii. Organization
iv. Department of work
v. Position within Department/Institution
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