PROVIDER AND CONSUMER PERSPECTIVES ON MOBILE MONEY AND MICROFINANCE IN GHANA

by

JUDITH N. ABOAGYE

(Under the Direction of Sophia T. Anong)

ABSTRACT

This study examined the use and impact of mobile money and microfinance services to determine the factors that influence their use, and to identify their separate and complementary impact on financial inclusion in Ghana. Qualitative data collected through interviews with service providers, agents, and focus groups were used to draw parallels and contrasts between provider and consumer perspectives on impacts and challenges of the systems. A survey sample of 280 respondents was also used in a series of logistic regression analysis to determine the indicators of the using mobile money for payments, remittance, and saving, and microfinance for borrowing, saving, and investing. The results showed that regulation, network and system failures, fraud and security concerns, and consumer behavior were the major environmental challenges to the growth and sustainability of mobile money and microfinance. While regulatory challenges were the primary concerns from provider perspectives, network capacity and consumer lack of awareness and understanding of the system were recognized as major challenges by both service providers and consumers. Socioeconomic factors such as age, education and income as well as consumer perceptions about usefulness, ease of use, and

security of the systems were found to be important indicators of usage behavior. The overall conclusion of the study is that mobile money and microfinance are both facilitating access to alternative financial services and the overall goal of financial inclusion. The specific use options may appeal to different segments of the population but mobile money is mainly driven by its usefulness and microfinance by its ease of use. However, there are eminent challenges relating to regulation, network and system failures, as well as security and fraud that need to be addressed.

INDEX WORDS: Mobile money, Microfinance, Financial inclusion, Provider perspectives, Consumer perspectives, Saving, Borrowing, Remittance, Payments

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DEDICATION

To my dear husband and best friend, Daniel Larbi Aboagye, thank you for the motivation, the encouragement, the support, and the sacrifice. I couldn't have done this without you.

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

Financial products for the poor have existed for decades in the form of microfinance, which offer informal credit mechanisms such as savings groups, moneylenders, and social support networks as an alternative to formal banking. The inability to deliver these products cost-effectively coupled with challenges relating to regulation has made it difficult for microfinance institutions (MFIs) to reach significant scale, particularly in Sub-Saharan Africa (Parada & Bull, 2014). However, over the past few years, due to rapid mobile phone penetration, many African countries have experienced remarkable advances in transformational mobile money services which deliver financial services to the poor. Mobile money appears to have leaped ahead of traditional banking and microfinance as a cost-efficient model of financial inclusion as there are now more mobile money accounts than bank accounts (Nyame-Mensah, 2013; Parada & Bull, 2014; Pénicaud & Katakam, 2014). At the same time, some MFIs are also leveraging mobile money systems for their loan repayments, loan disbursements, and savings transactions with clients (Cracknell, 2012; Gant, 2012; Hanooch & Rotman, 2013).

Several studies have documented the contributions of mobile money to financial inclusion and the opportunities and challenges it presents to African countries and the global financial sector (Au & Zafar, 2008; Dorsey & Jacob, 2005; EIB, 2014; Parada & Bull, 2014). However, these studies have primarily focused on eastern and southern African countries. Thus, the literature on the pace of adoption and overall market potential of the mobile money industry in West African Countries is almost non-existent and previous studies indicate a low adoption

rate in Ghana (Dzokoto & Mensah 2012; Tobin & Kuwornu, 2011). This study examines the impact of mobile money and MFIs as key drivers of financial inclusion in Ghana. The overall purpose was to determine how the mobile money and microfinance sectors operate separately and intersect. To do this, the study used a mixed methods approach to obtain and analyze detailed information from the perspectives of service providers and everyday users.

Definitions

The terms *mobile-banking, mobile-finance, mobile-payments, mobile-transfers, and mobile money* have been used to refer collectively to a set of applications that enable people to use their mobile telephones to manipulate their bank accounts, store value in an account linked to their handsets, and use the value for transfers and payments (Donner &Tellez, 2008). The purposes and structures of these systems vary from country to country but typically offer a variety of financial functions. These include micropayments to merchants, bill-payments to utilities, money transfers between individuals, long-distance remittances, and access to credit or insurance products. According to Porteus (2006), mobile banking is additive when it merely adds to the range of choices or enhances the convenience of existing traditional banking for consumers. It is transformational when it extends a new service to customers who would not be reached profitably by traditional branched banking. The present study focuses on transformational mobile banking which will from now on be referred to as mobile money.

It is important to note that while this study specifically focuses on mobile money which is a subset of the broader field of mobile finance or digital finance, some studies use digital finance, mobile banking, mobile payments, and mobile money interchangeably. Most scholars, however, separate mobile banking, mobile payments, and mobile money into different categories of mobile

finance or digital finance. For the purposes of this research, mobile money refers to the cash management service available on the mobile phone that enables users to store value in an account accessible via the handset (the m-wallet); convert cash in and out of the stored value account; and transfer stored value between accounts. Transformative mobile money accounts allow users to make financial transactions using the mobile phone without being connected to a bank account.

Microfinance involves the provision of relatively small amounts financial services including savings, loans, and insurance to socially and economically disadvantaged segments of society. The concept, which originated in the context of self-help, is dominated by micro-credit, and is emerging as a powerful tool for poverty reduction and financial inclusion in most developing countries. For the purposes of this research, microfinance refers to non-bank financial services which include the provision of micro loans and small deposits for the poor or those who do not have access to formal financial services.

Mobile Money in Ghana

Mobile money was launched in Ghana in 2009 by the multinational MTN Group, and currently, four of the country's six mobile network operators (MNOs) offer mobile money products namely MTN Money, Airtel Money, Tigo Cash, and Vodafone Cash. According to a 2015 report by the National Communication Authority (NCA), MTN is the largest of the six MNOs having about 47% of the market share of the telecom data subscription, followed by Airtel with 20%, Tigo with 16%, and Vodafone with 14%, while the new entrants GLO and Expresso, have about 2% and 1%, respectively.

Sub-Saharan Africa (SSA) had 98 million registered mobile money users, representing 48% of the global user base with the most visible success story being Kenya's M-pesa, which

was launched in 2007 and had over 18 million subscribers by 2013 (Parada & Bull, 2014). As shown in Table 1.1, the same trend is true for Ghana. Between 2012 and 2015, the volume and value of mobile money transactions soared from 18 million to 266 million and GHC594m to GHC35bn, respectively (NCA, 2015). Around the same period, there was a 15% increase in the share of Ghanaians participating in the financial system through non-bank formal means. The increase was driven primarily by the widespread adoption of mobile money for financial services (PricewaterhouseCoopers, 2016).

Table 1.1 *Mobile Money Trends in Ghana 2012-2015*

	2012	2013	2014	2015	Annual growth in 2015 (%)
Total number of mobile phone subscribers (Cumulative)	25,618,427	28,026,482	30,360,771	32,826,405	8.12
Registered mobile money customers	3,778,374	4,393,721	7,167,542	13,120,367	83.05
Active mobile money customers	345,434	991,780	2,526,588	4,868,569	92.69
Registered agents	8,660	17,492	26,889	79,747	196.58
Active agents	5,900	10,404	20,721	56,270	171.55
Total volume of mobile money transactions	18,042,241	40,853,559	113,179,738	266,246,537	135.24
Total value of mobile money transactions (GHC Million)	594.12	2,652.47	12,123.89	35,444.38	192.35

Source: National Communications Authority (NCA), Ghana

As of the end of 2015, 36% of Ghanaians formally participated in the financial sector, 22% were semi-formal participants, 17% were informal participants, and 25% were excluded from the

financial sector. Additionally, about 20% of the adult population had mobile money accounts and 17% were active account users (Bank of Ghana, 2016; PwC, 2016).

Ghana initially adopted a bank-led many-to-many branchless banking model in 2008 requiring mandatory interoperability to guide its mobile money operations. However, performance of the sub-sector was not impressive compared with peer countries such as Kenya and Tanzania and the guideline was repealed and replaced with the e-money issuers (EMI) guidelines in 2015. These guidelines, developed by the central bank, Bank of Ghana, require that non-banks apply for licenses to be a dedicated e-money issuer (DEMI), and there is no mandate for a bank-led many-to-many model or interoperability. However, DEMIs are overseen by the Bank of Ghana, and may retain a portion of interest on e-money floats, and expand permissible transactions (Bank of Ghana, 2016)

Generally, mobile money transfer service allows people to send money to others using Short Message Service (SMS), at relatively lower costs regardless of whether the user has a bank account or not. A set of SMS menu commands and PIN numbers are used with even a standard or feature phone to send or receive funds from mobile money service subscribers. In most cases, a user can visit a corner kiosk or grocery store and transact with an independent retailer working as mobile money agent. Mobile money provides alternative access to financial services for the unbanked and even some banked clients who tend to see conventional banks as inconvenient in terms of physical access, congestion, cost, and speed of transactions. In such cases, mobile money is used as a complementary service, but for most, the only form of nontraditional banking service (Tagoe, 2016). Traditional banks, however, remain an integral ‘secondary party’ of mobile money as allies with MNOs either as custodians of the stored value mobile money ‘float’ accounts, or providing products bundled with the mobile money account such as savings, loans,

and insurance. This is the mechanism through which mobile money facilitates financial inclusion.

The mobile money transaction process typically involves a one-time registration and one or more of the three service processes namely, cash-in, transfer, and cash-out. The registration process is usually free and involves a visit to an agent, the completion of an application form, an ID verification, the creation of the mobile money account (m-wallet), and selection of a PIN by the consumer. The cash-in process involves the purchasing of electronic money by visiting an agent and paying the cash amount for the e-value, and the transfer of e-value from the agent's merchant wallet to the consumers m-wallet. The transfer and cash out processes may be initiated with or without a registered mobile money account and are commonly referred to as sending and receiving. With a registered mobile money account, the consumer can directly transfer funds from their m-wallet to another account holder or non-account holder on the same mobile network from their cell phone without visiting an agent. A confirmation message showing the recipient's phone number, transfer amount, and service charges must be approved by the sender and then the receiver's account is credited, or a transfer code (token) is generated where the receiver is a non-account holder. Transaction fees are typically higher for transfers to non-account holders and the token must be presented to receive the money at any agent location.

Microfinance in Ghana

Microfinance has a long history in Ghana as people have traditionally saved and taken small loans from individuals and small self-help groups to engage in small retail businesses or farming ventures. Anecdotal evidence suggested that the first credit union in Africa was probably established in Northern Ghana by the Canadian Catholic missionaries. Meanwhile, "susu" which

is one of the current microfinance systems in Ghana, is thought to have originated in Nigeria and spread to Ghana from the early 1900s (Asiama & Osei, 2007; Antwi, 2015).

Typically, there are three broad types of MFIs operating in Ghana. First, there are the formal suppliers of microfinance which include rural and community banks as well as commercial banks providing small loans. The second group is the semi-formal suppliers of microfinance which include savings and loan companies, credit unions, financial nongovernmental organizations (FNGOs), and cooperatives. The third and most prolific group is the informal non-bank suppliers of microfinance which include both licensed and unlicensed "susu" collectors and clubs, rotating and accumulating savings and credit associations (ROSCAs and ASCAs), traders, moneylenders, and individuals. This research primarily focuses on the semi-formal and informal suppliers as MFIs in Ghana. The formal suppliers of microfinance are included in the study as traditional banks.

According to the Bank of Ghana (2016), the semi-formal microfinance sector currently includes 31 savings and loans companies, 23 finance houses, and about 400 licensed microfinance and money lending companies. MFIs typically fall in one of three tiers and may be either large-scale bank-like providers (branches and almost all the regions), small-medium scale providers (few branches in 1 or 2 regions), or a micro-scale semi-formal provider (one-branch local provider). As shown in Figure 1.1 savings and loans companies (SLCs) and credit unions are specialized deposit-taking institutions and typically considered as tier one MFIs. Tier two MFIs may be either deposit-taking or finance (credit) only institutions, and tier three MFIs are strictly money lending agencies and FNGO's. Additionally, ROSCAs, ASCAs, licensed individual susu collectors, and money lenders are typically included as tier 3 informal providers. About 80% of Ghana's working population operate in the informal sector and is characterized by

high illiteracy rates, exclusion from formal financial services, and credit constraints. Access to financial services and investment capital is imperative for the development and growth of this sector, and the national economy (Asiama & Osei, 2007). Despite the evolution of the products and services and expanding market potential of microfinance over the past three decades, there is scant data on the operations and socioeconomic impact of the microfinance sector in Ghana.

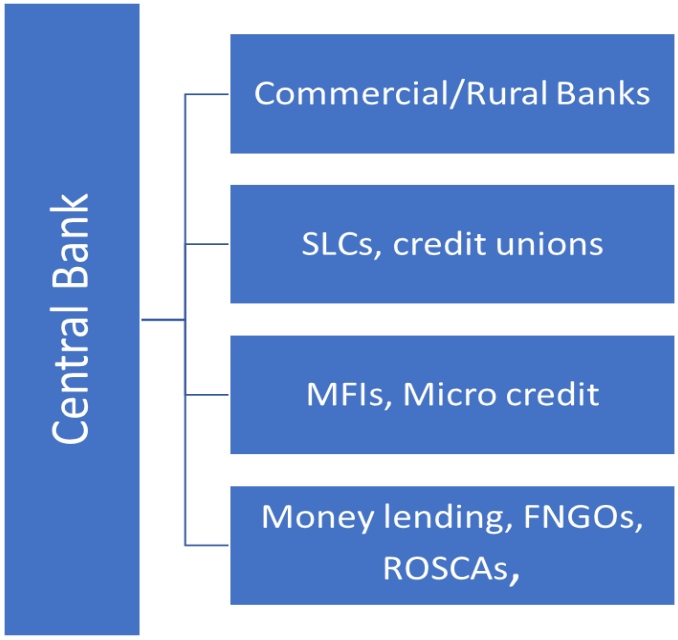

Figure 1.1 *Structure of the Microfinance Sector in Ghana*

Microfinance and mobile money have made important strides in serving this majority underserved population by facilitating formal convenient and low-cost money transfers and payment services. However, there is very little research-based evidence on their impact as previous studies have primarily focused on consumer perspectives and adoption rates. This study, therefore, attempts to link the adoption, use, and impact of mobile money and

microfinance in relation to access, perceptions, attitudes and behaviors, and social/cultural influences on transactions. The overall purpose is to explain what factors influence the adoption and use of these transformative services, their intersections in the financial service ecosystem, and their impact on financial inclusion.

Statement of the Problem

Existing literature indicates that compared to countries in other regions, African countries have less access to formal financial services and tools. Besides, the financial service sector in Africa continues to face distinct developmental challenges related to issues of trust, consumer protection, and operation network systems (EIB, 2014; Parada & Bull, 2014; World Bank, 2012). Studies have also indicated that about three-quarters of the countries participating in the technological revolution of mobile money are in Africa. Mobile money has also been shown to have expanded financial access to the working poor in Kenya and Tanzania, where the adult populations with formal bank accounts have increased steadily alongside the viral growth in mobile money accounts (EIB, 2014; Parada & Bull, 2014; Simpson, 2014).

Previous studies have focused on this trend in mostly eastern and southern Africa, with little evidence-based research on the adoption, use, and impact of mobile money in West African countries including Ghana. In addition, microfinance has been the primary source of credit and savings for small-micro enterprises and low-income households for several decades in most African countries. While some researchers believe that mobile money is the bridge to financial inclusion for Africa, others have also noted that given the technological infrastructure required for mobile money, microfinance could still be a better model in some places (Parada & Bull, 2014; Pénicaud & Katakam, 2014).

Another phenomenon is the co-existence of the two systems. For the most part, studies have examined the use and impact of mobile money and microfinance separately and very little attention has been given to the important intersections between the two in relation to financial inclusion. Some microfinance programs have successfully incorporated mobile money to provide convenient loan disbursement and payment options such as Musoni and Faula in Kenya, and the b-Kash project with Building Resources Across Communities (BRAC) in Bangladesh (Cracknell, 2012; Hanouch & Rotman, 2013).

This research examines the ecosystem of mobile money and microfinance in Ghana, to determine what factors influence adoption of these services separately and simultaneously and to identify their role and impact on financial inclusion in Ghana. The study employs a mixed methods approach that combines the use of qualitative and quantitative methods. The study explores the perspectives of banks, MNOs, MFIs, mobile money agents, and consumers, to draw assertions on the factors influencing the choice of product or service, key successes and challenges, and the overall impact of mobile money and MFIs. A consumer survey and in-depth individual and group interviews were conducted to collect data from these stakeholders.

Data on consumer perspectives were collected through focus group interviews as well as a larger-scale survey. Questions focused on identifying factors that influence the choice of financial products or services as well as the impact and challenges associated with the use of the products and or services. Interviews with service providers (Banks, MNOs, and MFIs) were focused on supplier perspectives on product design and permissible services, agent networks, regulation and licensing, and opportunities for partnerships and scale. Interviews with mobile money agents were also focused on direct marketing issues such as client retention, service pricing and disclosures, profitability, consumer protection, and security and technological

challenges. Interviews were conducted either in person or by phone using a semi-structured protocol with mostly open-ended questions and consent for audio-recording was sought.

Research Questions

In order to examine the role of mobile money and MFIs in relation to financial inclusion in Ghana, this study seeks to answer the following specific research questions:

1. What are the environmental obstacles/challenges to growth and sustainability of mobile money and microfinance services?

2. Are mobile money services and MFIs advancing the overall goal of financial inclusion separately or integrally?

3. What role do socioeconomic variables, consumer perceptions, and attitudes play in the adoption and use of mobile money and microfinance versus formal financial services?

Significance of the Study

Previous studies focus primarily on consumer perspectives on mobile money adoption and revealed a distinct gap in the adoption of basic financial products and service for the urban poor in Ghana. Studies have shown that cash is still the primary form of payment for day-to-day purchases and mobile money products are mainly targeting the middle and upper class. The urban poor has the least knowledge and lowest degree of confidence in the utility of mobile money products (Dzokoto & Mensah 2012; Dzokoto & Appiah, 2014). Besides policy focus on increasing financial inclusion in Ghana, regulatory, service-provider partnerships, and educational barriers remain a major hindrance to mobile money expansion. Additionally, microfinance research on the gaps in the regulatory framework and impact on financial inclusion in Ghana is limited.

This study is significant because it seeks to explore the impact of mobile money and microfinance services on financial inclusion from the perspectives of both the service providers and the consumers in Ghana. The results of this study are expected to provide important insights for innovation in the financial sector, regulation reform on inclusive financial policies, and improved integration between mobile money and microfinance services as drivers of financial inclusion and economic development. Financial service providers would benefit from this research as they would have a better understanding of the perspectives of consumers. Consumer advocates and educators would benefit from the insights on consumer perceptions and attitudes and behavior in developing consumer education and empowerment programs in the absence of specific consumer protection guidelines. Governments would also gain considerable insights about consumer and provider perspectives in relation to policies and regulations that promote or hinder the growth and sustainability of the mobile money and microfinance industries in Ghana.

CHAPTER 2

LITERATURE REVIEW

The goal of this research is to examine the adoption and impact of mobile money and microfinance services in Ghana. The overall purpose is to determine whether these alternative financial services complement or compete with traditional banking services and determine the extent, if any, to which mobile money is integral within microfinance practices in Ghana. The study employs a mixed methods approach to explore the perspectives of service providers, agents, and consumers to address the three main research questions. The chapter begins with background information on the environment for the two services and a discussion of environmental challenges including regulatory framework and consumer protections. This is followed by a review of previous studies on the impact of mobile money and microfinance, and factors influencing adoption of both types of services including integrated use of the two. Finally, the theoretical framework and hypotheses for the study are presented.

Background

Financial inclusion

Empirical evidence indicates that access to basic financial services such as savings, payments, and credit is associated with positive impact for both individuals and firms and lack of access to finance is often a major obstacle to firm growth particularly for small-medium sized enterprises (SMEs) (Beck & Demirgüç-Kunt, 2006; Beck, Demirgüç-Kunt, & Martinez Peria, 2008a; Caskey, Durán, & Solo, 2006; Dupas & Robinson 2009; Garang 2015; Ouma & Ramo, 2013). Access to finance or financial inclusion refers to the availability of financial services in

the form of demand deposits, credit, payments, or insurance, and the degree to which these services are available at a fair price (Beck & Demirgüç-Kunt, 2006). Facilitating financial access is therefore recognized as a primary factor for strengthening the financial sector of developing countries, and ultimately, economic development.

Studies have however shown that about 80% of the adult population of SSA do not use formal financial services with only 24% having an account at a formal financial institution (CGAP & World Bank, 2010; KPMG, 2013; World Bank, 2012). Research also shows that geographic, infrastructural, and institutional barriers are the primary indicators of financial exclusion (Ardic, Mylenko, & Saltane, 2012; Demirguc-Kunt & Klapper, 2013; Garang 2015). Poor transportation and communications infrastructure, as well as socioeconomic factors such as gender, age, and education level, have been shown to impede expansion of financial services (CGAP 2014; Grameen Foundation 2013; GSMA 2013; Stefanski, Muhammad, Bohnstedt, & Smith, 2012). These factors are briefly discussed in the following sections.

Physical and structural barriers.

Proximity to a financial institution remains a major geographic constraint. Such geographic constraints are more likely to affect rural residents than those living in urban areas and more so rural women. The percentage of adults in rural areas who are formally 'banked' is therefore consistently lower than adults in urban areas due to the time and distance of travel to reach banks (Daniels, 2015; Herrington & Kelly, 2012). Particularly in SSA, adults in cities with one million or more inhabitants report a rate of account ownership more than double that of adults living in towns or villages with a population under 10,000 (Klapper and Demirguc-Kunt, 2012).

Factors such as technology and infrastructural development, policy and regulatory environment and market share of MNOs may all impact the innovation process and subsequent adoption of the mobile money technology and its integration into existing internal financial products or cooperation with service partners such as MFIs and banks. Au & Zafar, (2008) suggested that the adoption of m-payments is typically associated with how the stakeholders interrelate with each other and the conditions of the environment in which they operate. M-payments in this context refer to any financial transaction executed on a mobile device in-store or remotely, and therefore includes but not entirely exclusive to mobile money transactions.

Banking processes and requirements such as complicated paperwork and identity document and salary statements rarely accommodate the low literacy levels and non-formal income sources of the poor and consequently isolates them from formal financial services. Grameen Foundation (2013) also identified structural supply-side issues such as menus that are not intuitive, complex and costly registration and sign-up processes, and security passwords that are difficult to remember. These structural barriers can feed into misconceptions among the poor and lead to a reluctance to engage with local banks or for that matter any form of financial system such as MFIs and mobile money systems. This study accounts for the effects of these barriers by controlling for external factors and consumer attitudes in the theoretical model.

Socioeconomic barriers.

Studies have emphasized the importance of age, income, gender, and education on financial access and adoption. For instance, Klapper and Demirguc-Kunt (2012) indicated that among adults in the poorest 40 percent of households within developing economies 54 percent remain unbanked compared to 40 percent of the richest 60 percent of households. Additionally, 30 percent of people around the world who had no access to formal financial services reported

that the lack of sufficient funds to hold a bank account is the biggest barrier to financial inclusion. Young people also face significant barriers to financial inclusion and may be forced to save informally. This is because formal financial service providers tend to view young people as overly risky and unable to manage money, and for those under 18, there is often a legal barrier to opening a formal account (Allan, Massu, & Svarer, 2013).

Women have been shown to reinvest larger percentages of their incomes in their families compared to men, and are also recognized as a better credit risk and yet are more likely to be financially excluded (Allan et al. 2013; Borges, 2007). There is 6-9 percentage point gender gap in bank account penetration across relative income groups within developing economies (Klapper & Demirguc-Kunt, 2012; McGregor, 2013). Women's World Banking (2015) asserted that women typically take more time to adopt to new financial services and technologies. This may be due to a variety of factors such as lower literacy levels, informal or irregular sources of income, lack of legal identification documents or formal collateral, and time and mobility constraints. In some African countries, bank accounts sometimes require a husband or male figure's signature, or evidence of property rights. Kenyan men were found to be more likely to use banks while women predominantly used the informal sector for their saving and borrowing needs (Arnold & Johnson, 2012). These social norms coupled with low and irregular incomes restrict access to financial services and mobility among women.

The literature reviewed so far indicate that there are multiple barriers to financial inclusion and these barriers generally represent a mix of supply-driven and demand-driven factors. Amid these constraining factors, recent innovations in financial products and services such as mobile money and mobile microfinance have proven successful at improving financial

access in countries like Kenya, Tanzania, and the Philippines (Au & Zafar, 2008; Cracknell, 2012; Parada & Bull, 2014).

Impact of mobile money

Only two percent of adults worldwide have a mobile money account but 12 percent of adults in Sub-Saharan Africa do and for half of them, the mobile money account is their only connection to the financial system (Demirguc-Kunt et al., 2014). Kenya's M-pesa is a mobile money success story modeled by other mobile money platforms. According to Cracknell (2012), the factors which appeared particularly important for M-pesa's success include country factors such as a ready market, product appropriateness, a strong agency business case, liquidity management, and the dominance of Safaricom, the MNO provider of the service.

Other successful mobile money operations have emerged in places like Tanzania, Zimbabwe, Uganda, Ghana, Nigeria, and Cote d'Ivoire. Yet, the adoption rate differs across country and most operators continue to struggle with challenges related to distribution, liquidity management, product development, risk management, and fraud. However, the basic foundations of the industry have been shown to work in multiple markets, and mobile money has definitely had an impact on increasing access to formal financial services (Parada & Bull, 2014).

Mobile money adoption in Ghana is considered low, and most of the products were targeted at the middle and upper-income classes to the exclusion of lower-income groups. Ghanaians preferred transacting business in physical cash and therefore apart from sending remittances, mobile money had not shown a salient impact on social life in Ghana (Dzokoto & Mensah, 2012; Dzokoto & Appiah, 2014; Tobin & Kuwornu, 2011). However, it has been found that active users and facilitators of MTN mobile money do receive value from using/providing

banking services via the mobile phone, particularly for business development (Nyame-Mensah, 2013). The samples for these studies were based on distinct segments of consumers and could explain the variations in findings, but the general indication was that mobile money had tremendous prospects in the financial service ecosystem.

This research seeks to expand the literature on mobile money in Ghana by identifying usage patterns and indicators across three different service options namely payments, remittances, and savings. Also, the approach involves the use of multiple case studies to present both provider perspectives and user experiences.

Impact of microfinance

MFIs are important lending institutions and growth catalysts in developing countries and therefore receive substantial domestic and international support. Microfinance is an integral part of poverty alleviation as products assist to meet basic household needs, support livelihoods, and assist with asset accumulation (Asiamah & Osei, 2007; Singh, 2009). Microfinance schemes are not only useful financing options, but important tools for economic empowerment and social change, particularly for women (Ahmed-Karim & Alders-Sheya, 2015; Allan et al., 2013; Dzisi & Obeng, 2013; Women's World Baking, 2015). For instance, Dzisi and Obeng (2013) surveyed 840 women beneficiaries of microfinance in Ghana and concluded that about 72% of the respondents reported being better financially resourced to provide the educational, health, and basic needs of their families. Majority of the respondents also indicated they had better housing conditions and improved financial conditions to engage in communal activities following their participation in the microfinance sector. Survey results of 85 Ghanaian women entrepreneurs who participated in a microfinance scheme for about ten years indicated that the women had

expanded their businesses, acquired assets, and improved livelihoods which transferred to better overall well-being of their families and communities (Azanlerigu & Kuntulo, 2015).

MFIs are a common alternative to saving and borrowing at a traditional financial institution in most developing countries. According to Demirguc-Kunt et al. (2014), just about 9% of adults in developing economies save at and borrow from a formal financial institution, and the rest use informal options such as MFIs, individual money lenders, and family members. While the microfinance sector has demonstrated positive impacts on the social, financial and economic well-being of the poor, there are challenges to providing flexible product options to meet the needs of low-income households, at reasonable costs for both users and providers. With mobile money, there are opportunities to be explored through its integration with microfinance and thus the focus of this research. Additional challenges relating to regulation and supervision as well as consumer protection issues are reviewed in the next sections.

Environmental Challenges to the Growth of Mobile Money and Microfinance

Regulation of mobile money

Mobile money transfers present a significant opportunity for expansion of financial access particularly for Africa, where three-quarters of the countries that use mobile money most frequently are located. However, there are issues relating to transparency of pricing, technology standards and data protection, licensing, and regulation all of which require specific policy implementation to promote development and protect the consumer (Simpson, 2014). While there is the danger of the negative effects of a strict regulatory framework on growth and development, there is also a need to regulate risks to consumers in a way that protects the valuable and vulnerable savings of the poor (Simpson, 2014; Tagoe, 2016; Williams, 2013). The underlying issue lies in the development of cross-sectoral policies given that mobile money spans across two

distinct industries with telecommunications and payments being transactions and fee-based, and banking being float-based (Dias & McKee, 2010; Donovan, 2012; Ehrbeck & Tarazi, 2011).

The 2015 EMI guidelines issued by the Bank of Ghana require 80% of accrued interest on float accounts to be paid to customers while the remaining 20% is retained by the EMI. With this requirement, traditional banks now view mobile money as a threat, and this is likely to foster more innovation, competition, and partnerships in the financial sector (PwC, 2016). For instance, Ecobank Capital Advisors have introduced Tbill4All, a mobile-money-based service designed to allow the unbanked to purchase and manage Treasury Bills directly from their mobile phones. Airtel Ghana in collaboration with Bank of Africa also introduced cross-border inward mobile money transfer allowing transfers between Airtel wallets and other international mobile wallets. Additionally, the EMI guidelines include provisions for the management and recruitment of agents as well as an agent registry to be put in place. It also provides for consumer protection, complaints procedures, recourse mechanisms and Anti-Money Laundering/Combating the Financing of Terrorism (AML/CFT) Policies (Bank of Ghana, 2016). Details of the consumer protection provisions will be discussed under the section on consumer protection issues.

The mandatory accrued interest on stored value in mobile money accounts provides consumers earnings that had been neglected for decades (Zetterli, 2015). However, there are some inherent concerns about the capacity of MNOs to effectively and efficiently manage financial service operations in the absence of a more robust regulatory framework (Tagoe, 2016; Williams, 2013). What remains to be seen is the impact of this more flexible and conducive policy environment on the development of the financial ecosystem as well as consumer adoption. The study seeks to identify these impacts by exploring the perspectives of service providers and consumers using both qualitative and quantitative analysis.

Regulation of microfinance services

The microfinance sector also has its share of challenges relating to licensing and regulation. For example, microfinance institutions operating in Ghana may be either formal suppliers such as rural banks and savings and loans companies; semi-formal suppliers, such as credit unions, financial nongovernmental organizations (FNGOs), and cooperatives; or informal suppliers, such as susu collectors and clubs. However, in terms of regulation, rural and community banks were regulated under the Banking Act 2004 (Act 673), while the savings and loans companies were regulated under the Non-Bank Financial Institutions (NBFI) Law 1993 (PNDCL 328). The rest of the players such as FNGOs, susu collectors, and moneylenders are typically unregulated (Asiama & Osei 2007, Bank of Ghana, 2011). Consequently, in 2013, Ghana witnessed unprecedented collapses of MFIs, although most of them had met the minimum requirement for licensing by the Bank of Ghana (Addo, 2014). These unusual collapses of MFIs particularly in 2013 could be attributed to overtrading, diversion of funds, high interest rates, and failure to comply with regulatory policies among other possible factors (Antwi 2015).

Consumer protection issues relating to mobile money and microfinance

The financial services sector faces distinct developmental challenges relating to issues of trust, consumer protection, and systemic network risks that can slow the pace of progress and thus require clear regulations (Stefanski et al. 2012). They argued that consumers in the remittance markets are exposed to excessive prices of transfers with some providers charging a fee as high as 40% of the amount sent, and those in the mobile money markets face a lack of tangible proof of payments. The consequence is that in the event of a dispute, the consumer will have no evidence to support the claim of a payment and may be exposed to abusive billing or "double-charging." According to Donoghue and de Klerk (2009), consumers in developing

countries have different cultural backgrounds and varying degrees of sophistication relating to consumer protection and therefore establishing a redress environment that ensures fairness and appreciation of the consumer is extremely important. Moreover, inadequate recourse mechanisms where there is the absence of accessible and timely complaint and dispute resolution mechanisms can impede building customer trust in financial service providers (Chapman and Mazer 2013).

The consumer protection provisions in the EMI guidelines specifically introduced KYC requirement-based tiered accounts that enable both higher transaction limits and lower barriers to enrollment. The accounts range from a 'Minimum' with low ID requirements and a lower daily transaction limit of GHC 300 ($75) to an 'Enhanced' with near-bank grade ID requirements and a higher daily transaction limit of GHC 5,000 ($1,250). In addition to the mandatory interest pass-through mentioned earlier, the guidelines stated an intention to include e-money balances under an upcoming deposit insurance scheme. The guidelines also highlight requirements for responsible conduct, product disclosures, privacy protection, redress mechanisms, and equitable treatment of vulnerable populations (Bank of Ghana, 2015; Zetterli, 2015).

These provisions are intended to encourage positive saving attitudes and to provide secure returns on mobile wallet balances. However, whether there are appropriate mechanisms to promote consumer awareness and supervise adherence to these guidelines is a question yet to be answered. Exploring the in-depth perspectives of the key stakeholders in the ecosystem model will provide important insights on the success and challenges of this new regulatory framework in Ghana. Additionally, identifying the gaps in the regulation and supervision of MFIs will also provide insights on the processes, as well as opportunities and drawbacks of integrating mobile

money platforms into already existing microfinance systems, or perhaps new virtual mobile microfinance networks.

Factors Affecting Mobile Money Adoption

Active usage of mobile money products and services is still relatively low in most countries with account inactivity rates of about 65% globally (GSMA, 2015). Some of the reasons cited for inactivity include customer frustration with operational failures, ill-equipped front-line staff or agents, and weak product design. Preliminary findings also suggested that the system is not intuitive for most low-income customers (Koning & Cohen, 2015). The acceptance of any new product or technology can be influenced by the consumer's awareness of the product and self-efficacy, as well as the perceived usefulness, simplicity, compatibility, and creditability of the service (Argarwal & Prasad, 1997; Budree & Williams, 2013; Cudjoe, Anim, & Nyanyofio, 2015).

Dzokoto and Mensah (2014) employed multiple methods including industry data, a survey of 244 college students, and a poll of 1250 consumers to determine the adoption of mobile money in Ghana. The overall results showed low adoption rates particularly among the urban poor. They concluded that the commercial viability of mobile finance in Ghana would be determined by its ability to (i) replace the functions of cash, (ii) perform additional functions based on its unique characteristics and (iii) compete with existing alternate sources of money (both formal and informal) for legitimacy. If these conditions were not met, consumers would remain resistant to mobile money regardless of the potential.

Security and privacy issues are a well-documented obstacle to consumer acceptance of electronic money systems such as mobile money and are even more prevalent in developing

countries with high illiteracy rates. Cudjoe et al. (2015) also surveyed a conveniently selected 150 bank customers and found that consumer's attitude towards mobile banking adoption in Ghana was low (36.7%) despite the high level of awareness of the service (66.7%) among urban residents. Respondents were mostly skeptical about the reliability and usefulness of mobile banking service having considered the issue of security. Therefore, consumer attitudes and preferences play an important role in reaching the goal of financial inclusion particularly in SSA countries like Ghana. Similarly, Woldie, Hinson, Iddrisu, and Boateng (2008) surveyed 180 SMEs across the manufacturing, commerce and service sectors in Ghana and indicated that internet banking services were at the infancy stage. About 33% of the survey respondents had no knowledge of internet banking, and 55.6% had no internet connectivity. Majority of the respondents, however, indicated that security concerns were the major barrier to adoption and that they would still visit the bank in person even if their company adopts internet banking. While mobile money is believed to protect the valuable assets of the poor by reducing the need to carry cash and the risk of robbery and mugging, consumers are also skeptical of the security of the system with little to no paper trail of their transactions.

Even with high mobile money penetration, access to these services is still limited by geographic, regulatory, and socioeconomic barriers. Dzokoto & Appiah (2014) found that while the geographic barriers were reduced in relation to access to mobile money services given the agent network system, some eligibility and documentation issues such as picture ID requirements were still observed. Recent modifications to know-your-customer (KYC) guidelines allow for customer identity verification using Sim card registration database, and even more flexible options such as a verification letter in some remote locations. These options have relaxed the ID requirement for consumers in the mobile money market but some challenges remain in most

remote regions. Frimpong and Gyamfi (2016) also found that there were more male mobile money users (58%) than female users (47%) and more formal workers (60%) users than their informal counterparts (40%). The findings were based on a qualitative survey of 100 respondents from four urban-poor communities in Ghana and showed a relatively high usage as compared to previous studies. Some of the reasons for the non-use of mobile money in Ghana were complex procedures, delay in withdrawing money, inadequate agent network for account registration and customer service, distrust of the system and inadequate advertisement and illiteracy.

Factors Affecting Adoption of Microfinance services

Traditionally, unbanked individuals have relied on imperfect, costly, and risky informal mechanisms such as savings groups, moneylenders, or social support networks for their savings, credit and risk management products. However, these alternative financial products primarily delivered through microfinance have not been proven to be cost-efficient substitutes for formal financial products. Therefore, the cost of delivery in offering financial products to low-income individuals given the relatively small transaction sizes remain a major challenge for both the formal and semi-formal financial markets (Parada & Bull, 2014).

Typically, banks do not offer small deposits and micro-loans options while most MFIs on the other hand, focus solely on micro-credit without offering any savings, insurance, or short-term investment products to meet the needs of low-income households. Ghanaians were shown to have a strong culture of saving but which is mostly done through informal means with relatively high negative interest rates (where traditional “susu” collectors receive small daily deposits and return the total savings at the end of the month minus one days’ contribution). They also showed that 50% of the top 60% income earners save, and 43% have bank accounts but only

27% use banks to save while 23% of the bottom 40% of earners save, 15% have bank accounts, and only 5% use banks to save (Cignifi, 2012).

There is an increased recognition that poor people need a range of financial services, not just credit, given that their incomes are low, unpredictable and irregular. Therefore, focusing on providing micro-credit is not an all-in-one solution to financial exclusion (Allan et al., 2013; Ahmed-Karim & Alders-Sheya, 2015). To some extent, this issue of non-availability of suitable products also limits the poor from utilizing financial products from both the formal and semi-formal sectors. For instance, Mutesasira (1999) concluded that MFIs in Bangladesh have failed to reach the bottom 15% of society and there is a need to find other ways of reaching the poorest populations particularly through offering savings services. Collins et al. (2009) also studied more than 250 financial diaries of low-income individuals in Bangladesh, India and South Africa and found that each household uses at least four types of informal financial instruments in a year. These include interest-free loans and informal savings clubs with cash turnovers ranging from 77% percent to 300% relative to the net income of the households.

Mobile money and microfinance usage have been shown to be influenced by variables such as policy and regulation as well physical, structural, and socioeconomic factors. Existing research on the mobile money adoption and impacts in Ghana is inadequate and generally, indicate a relatively low patronage with a very positive outlook. The recent policy changes also present opportunities for competition as well as partnerships to foster an innovative and dynamic market with diverse products. The possible integration of mobile money and microfinance in Ghana is one such opportunity to be explored in this proposed research.

Integration of Mobile Money and Microfinance Services

Mobile money and microfinance services appear to operate parallel to each other but also overlap based on their similar goals of providing financial access to underserved and dispersed communities. Micro-credit transactions have increasingly been facilitated by readily accessible mobile money due to cell phones being prolific even in the most remote areas where branched banking or microfinance have not reached. There is also an indication of independent microfinance service users being drawn into the mobile money market through the integration of microfinance and mobile money platforms for convenient loan repayments and deposit service options.

For instance, Musoni Kenya was the first MFI to go completely cashless and now disburses all loans through M-pesa. A few other MFIs such as Kenya Women Finance Trust (KWFT), Faula Kenya, and SMEP DTM Limited also offered their customers the ability to use M-pesa for loan repayments, loan disbursements, and savings mobilization. These M-pesa enabled MFIs to offer their customers, convenient, less costly, and more flexible transaction options (Cracknell, 2012; Hanouch & Rotman, 2013). Similarly, BANKO Philippines and BRAC-bKash project in Bangladesh offered their customers payment, savings, credit, and insurance products accessible primarily over the mobile phone and at partner outlets (Chen & Rasmussen, 2014; Hanouch & Rotman, 2013). However, the authors maintained that MFIs were using m-banking most often for loan repayments and savings mobilization than for loan disbursements. This was because, with the high average value of loan disbursements and low transaction limits, customers had to withdraw from multiple agents, thus reducing convenience and increasing cost as multiple transaction fees must be paid.

Additionally, Kendall et al., (2011) found about 300 formal businesses including about 90 formal financial institutions which were integrated with M-pesa and other mobile money services. They also found numerous technology firms that had sprung up to facilitate these integrations, as well as innovative new businesses which have created financial services offerings operating solely over mobile money. The institutions integrating with existing products as well as those launching new ones frequently cited increased outreach and lower costs, especially in reaching poor clients, as motivations for adopting the mobile money platform. Gant (2012) however, examined performance variables of 25 MFIs in Kenya and found that mobile banking was associated with higher operating and personnel expense per total loan portfolio, but lower number of borrowers per staff member, and lower average loan balance. The author explained that cost reductions from increases in efficiency in managing loans might be limited until there is more widespread use of mobile banking that will come with the maturation of mobile banking programs and adaptation by users.

Moreover, Kusimba et al., (2013) found that apart from the formal banking and credit programs like M-kesho and M-shwari that were linked to mobile money, individual family networks as well as rotating savings and credit associations (ROSCAs) also used mobile money more frequently for convenience. Mobile money usage had penetrated informal saving groups, family associations, and kinship networks and fundamentally changed social life in Kenya by creating mobile communities of the “absent presence” and a “floating world.” However, only a small number of Kenyans were shown to employ mobile money services for diverse financial services including access to a formal bank account, credit services, payments, and money management. The majority (75%) of transactions were for remittance with clients cashing in and out very quickly.

The Ghanaian market has also witnessed similar integrations of investment, insurance and energy products with mobile money platforms. For instance, Ecobank Capital Advisors (ECA) "TBill4All" service allows customers to remotely register, apply, purchase, rediscount and redeem treasury bills through transfers between customers' mobile money wallets and ECA mobile money wallets. The instruments available on the mobile money platform are a 91-day and 182-day treasury bills (Bank of Ghana, 2016). Tigo Ghana in partnership with BIMA and MicroEnsure offer a free opt-in life insurance coverage in proportion to airtime usage as a loyal benefit to its customers with an option to double the coverage amount for a monthly fee of GH₵1 (US$0.25). Tigo has also partnered with PEG Ghana to provide the first mobile pay-as-you-go solar energy service to low income and rural consumers. Additionally, the social cash transfer program is in the process of being shifted onto mobile platforms to cost-efficiently reach poor and vulnerable populations (Bank of Ghana, 2016, Kumar & Winiecki, 2014; Zetterli, 2015).

There is no documented evidence of any existing integration of MFIs with mobile money platforms in Ghana, but it is likely that informal groups may be using it for convenience as was found in Kenya. Mobile money could well be the springboard to financial inclusion for the traditionally disempowered such as women, rural residents, and the poor. The intersection with microfinance could be an opportunity to overcome the challenges associated with its acceptance as a new technology. Exploring and understanding the intersections between mobile money and microfinance is a major contribution that may be the unrealized potential for sustained growth in financial access by communities in Ghana.

Theoretical Framework

As shown in the review of previous studies, various factors such as socioeconomic characteristics, infrastructure, regulation, and consumer attitudes may affect the adoption and use of mobile money and microfinance services in the context of any given country or region. These factors can be examined from various theoretical frameworks drawn from the fields of economics, sociology, psychology, and information technology. Three research questions are proposed for this study: (1) What are the environmental obstacles/challenges to the growth and sustainability of mobile money and microfinance in Ghana? (2) Are mobile money services and MFIs advancing the overall goal of financial inclusion separately or integrally in Ghana? (3) What role do socioeconomic variables, consumer perceptions, and attitudes play in the adoption and use of mobile money and microfinance versus formal financial services?

The ecosystem model grounds the present study to address these research questions from a systems approach of mobile money and microfinance services. Particularly for the first two questions, including service provider as well as consumer perspectives will increase understanding of the environment and the intersections between the services as they facilitate financial inclusion in Ghana. Typically, studies on the adoption of innovative financial services have been grounded in conceptual frameworks that borrow from various theories. For instance, some researchers have examined the factors affecting the adoption and use of new technologies using theories such Technology Acceptance Model, Theory of Diffusion of Innovation, General Systems Theory, Actor Network Theory, and conceptual extensions of these. A theoretically-driven conceptual model with hypothesized interrelationships is also adapted in this research adapting the technology acceptance model to hone in on consumer perspectives to fully explore the third research question in particular. These foundations are described in detail next.

Ecosystem model

According to the European Investment Bank (2014), the success of any digital financial system depends on the ability to add value for all the different parties in the 'partnership ecosystem (i.e. customers, banks, MNOs, MFIs, agents, financial regulators, and technology companies). As illustrated in Figure 2.1 a mobile money product requires multiple commercial partnerships where the parties are simultaneously working together and competing. Each partner has specific responsibilities to contribute to the development of the system and failure to add value for any one partner can ultimately result in the failure of the whole system.

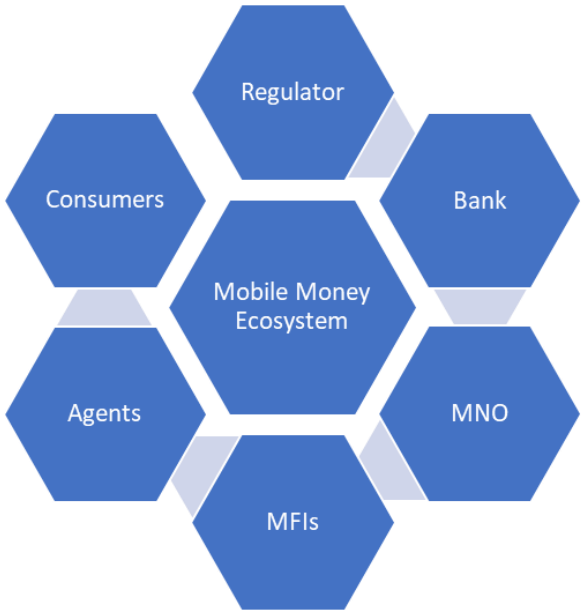

Figure 2.1 *Mobile Money Ecosystem Honeycomb*

Source: EIB (2014)

The key partners in the mobile money ecosystem as identified by previous studies include the regulators, infrastructure and technology companies, service providers such as banks, MNOs,

and MFIs, agents, and the consumer. The primary regulator here is the central bank which issues policies and guidelines relating to e-money issuance, agent networks, know-your-customer (KYC) requirements and consumer protection. These policies and guidelines ultimately govern what types of institutions can offer what type of services and consequently the development of financial inclusion policies. Infrastructure here refers to physical infrastructures, such as roads and electricity, cell-sites for mobile network and data connectivity, and financial infrastructure, such as national payment systems (switches), for transaction clearing among providers. The (under)development of these systems can greatly impact the growth and sustainability of the mobile money ecosystem in Ghana. The service providers which typically include banks, MNOs, MFIs, and other payment and retail companies require a combination of co-operation and competition to collaborate in an interoperable ecosystem. For instance, at the very basic partnership level, MNOs require banks to hold their float and banks require MNOs to issue a short-code for their customers to access their account over a mobile phone. As more advanced forms of partnerships develop over time, providers may compete for the same customers once integrated services and second-generation products like savings, loans, and insurance are offered. Using the ecosystem model approach helps identify key stakeholders with whom common themes related to successes and challenges of mobile money and microfinance in Ghana will be explored to address the research questions. This research specifically focused on selected service providers, agents, and consumers and does not include the perspectives of regulators and technology and infrastructure companies.

Technology Acceptance Model

The Technology Acceptance Model (TAM) developed by Davis (1989) is an extension of the Theory of Reasoned Action (Fishbein & Ajzen, 1975). While the Theory of Reasoned

Action is a general theory of human behavior, TAM was specifically designed to model user acceptance of information systems within an organizational context. It has been widely used in predicting usage behavior of various technological innovations. TAM posits that perceived usefulness and perceived ease of use are the fundamental determinants of use of any new system or technology (Davis, 1989; Davis et al., 1989). According to the authors, perceived usefulness refers to "the degree to which a person believes that using a particular system would enhance his/her job performance," and therefore there is an expected positive use-performance relationship for a system that ranks high in perceived usefulness. Perceived ease of use also refers to "the degree to which a person believes that using a particular system would be free of effort," and therefore a system perceived to be easier to use than another is more likely to be accepted by users. Attitude here is related to whether a person associates the behavior in question with favorable or unfavorable beliefs similar to its use in the Theory of Planned Behavior (Ajzen 1991). TAM also assumes that users could choose to employ a specific technology based on individual cost-benefit considerations and that the user's decision to use a particular system evolves over four stages as shown in Figure 2.2 (Davis, 1993; Davis et al., 1989; Rocker, 2009).

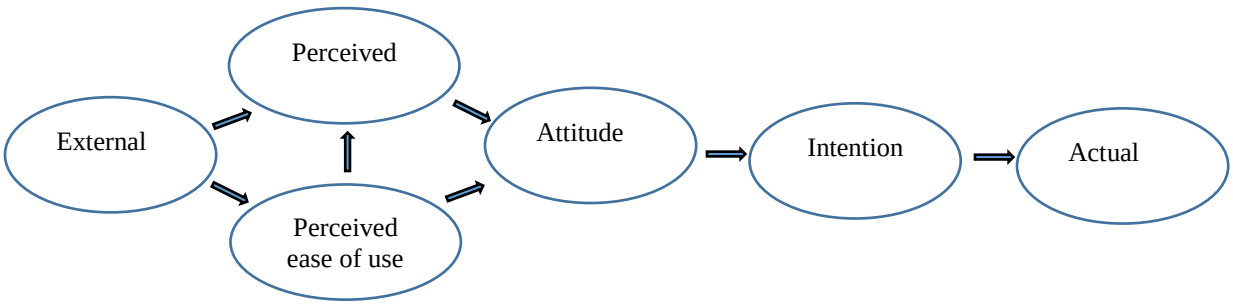

Figure 2.2 *Technology Acceptance Model*

Source: Davis et al. (1989)

As shown in the diagram, external variables (such as individual characteristics, system design features, or situational constraints) indirectly influence system usage through their impact on the perceived usefulness and perceived ease-of-use. These factors, in turn, affect a user's attitude towards the system, which then influences the intention to use the system, and consequently actual usage of the system. Additionally, Davis (1989) claimed that given any two systems with the same level of perceived usefulness, the one believed to be easier to use will be preferred by users. Building on this construct in relation to mobile money adoption in Ghana, Dzokoto and Appiah (2014), confirmed that a system or money object that is easier to use within the socio-cultural context will result in positive attitudes and faster consumer adoption, whereas those that are not will be slower to be accepted or even marginalized. Similarly, Cracknell (2004) identified the customer value proposition as the most compelling factor of the four dimensions of electronic banking for the poor. He further explained that moving users from a product which is easy to understand and free to use (cash) to a product which is both more expensive and more difficult to understand, presents a key challenge. This research, therefore, supports the theoretical importance of perceived usefulness and perceived ease of use as determinants of mobile money and microfinance systems use in Ghana.

The importance of security and privacy for the acceptance of online banking and mobile financial services is a widely recognized issue among researchers. Studies have consistently shown that security and privacy concerns are major barriers to the use of mobile banking as well as mobile money and mobile microfinance (Cudjoe et al., 2014; Dias & McKee, 2010; Hanouch & Rotman, 2013; Jahangir & Begum, 2008; Stefanskin et al., 2012). Given the importance of the issue of security and privacy in user acceptance of mobile banking, Jahangir and Begum (2008), included a privacy and security factor in their model to test customer adaptation of electronic

banking in Bangladesh using TAM. The modified version of the TAM used in the study measured security and privacy as a single variable and applied it as the third factor in addition to perceived usefulness and perceived ease of use, to predict customer adaptation of electronic banking (see Figure 2.3). The authors found that perceived usefulness, perceived ease of use, and security and privacy were all significantly and positively related to customer adaptation, and mediated by customer attitude. This research also supports the inclusion of a security and privacy factor in determining consumer acceptance of mobile money and microfinance in Ghana.

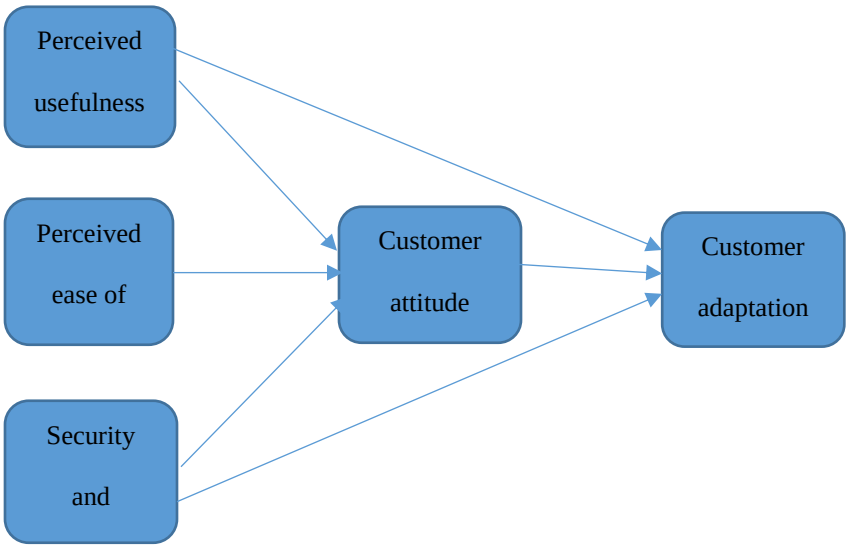

Figure 2.3 *Conceptual Model of TAM*

Source: Jahangir and Begum (2008)

Green, Collins, and Hevner (2004) also extended the TAM and included constructs from the theory of planned behavior (TPB) to study the effects of perceived control on the diffusion of

software process innovations. The integration of the TAM and TPB emphasized the importance on perceived usefulness and perceived ease of use, as well as the influence of attitude, subjective norms (influence of others in the social environment), and perceived control on usage behavior (see Figure 2.4). Their final model examined the effect of perception of control (measured as voluntariness, choice, and process) on satisfaction with and usage of an innovation and found significant but complex relationships between the perceived control dimensions and innovation usage.

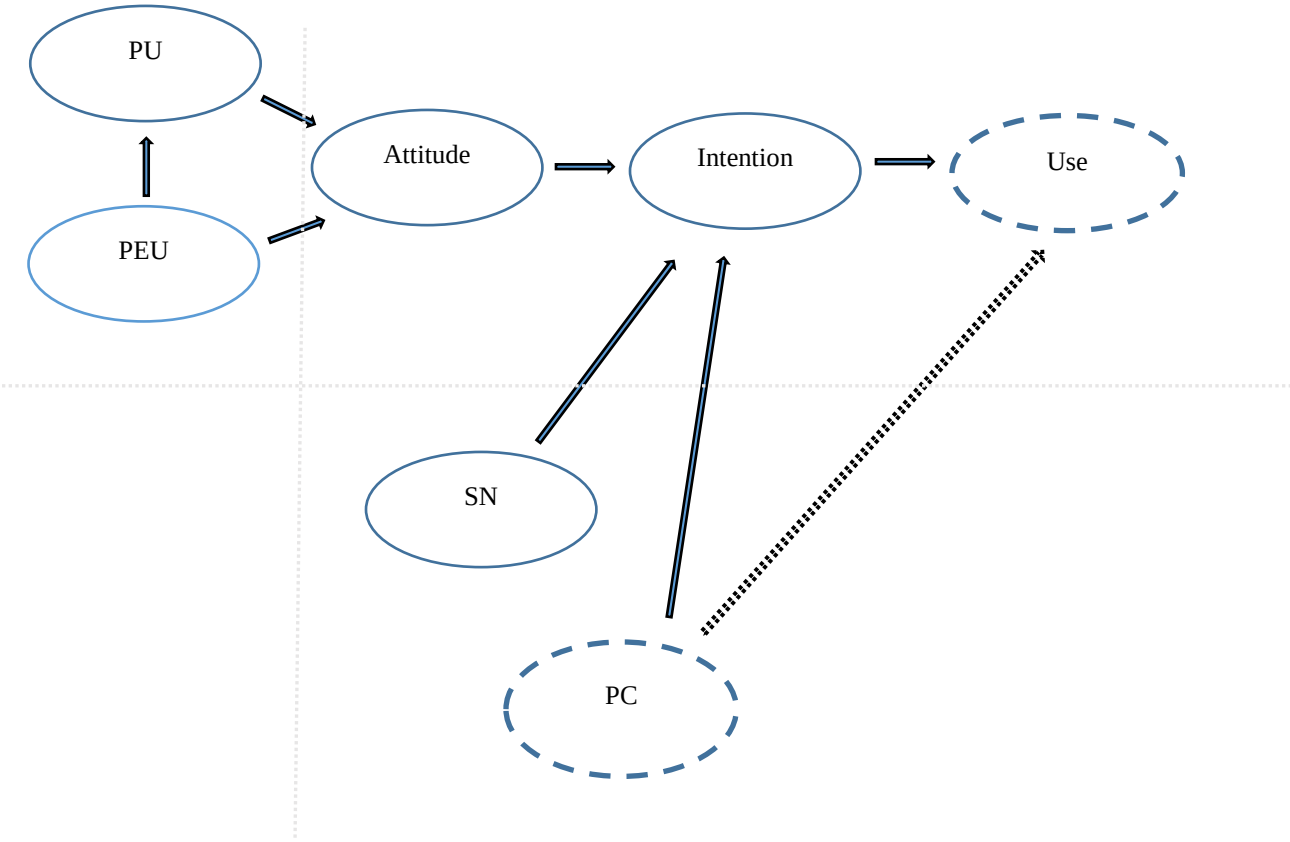

Figure 2.4 *TAM and TPB Models*

Source: Green et al. (2004)

Conceptual Model

A detailed representation of the selected constructs and the anticipated relationships tested in this study is shown in Figure 2.5. The adapted model helps to conceptualize the impacts of external factors, perceived usefulness, perceived ease of use, security and privacy, and the possible mediating effects of consumer (attitudes) preferences and perceived control, on the use of mobile money and microfinance systems in Ghana. External factors here may include individual characteristics and socio-demographic factors, situational constraints such as proximity, cost of service, and required documentation. These external factors may affect the consumer's use of mobile money and microfinance services directly or indirectly through their perception of the usefulness, ease of use, and confidence in the security and privacy of the system. These consumer perception factors may either directly affect their actual system use decision, or their effects on system use may be mediated by the second level of factors here identified as consumer (attitudes) preferences and perceived control.

Consumer attitude, as noted by Jahangir and Begum (2008) in the mobile banking context may vary in terms of perceptions about product information, forms of payment, delivery terms, service offered, risk involved, privacy, security, personalization, and visual appeal, among others. For the purposes of this research, attitude is defined as the individual's preference for mobile money or microfinance based on cost, convenience, and risk. Perceived behavioral control is defined in TPB as the degree of ease or difficulty associated with performing the behavior. This factor of control beliefs may reflect the effect of past experiences as well as anticipated obstacles or impediments. In this study, the perception of control relating to mobile money and microfinance is measured as the availability or unavailability of other financial service as options for the specific service. Subjective norm was not used in this study because the

socio-cultural influences are expected to be addressed as part of the external factors. Besides, previous research which examined the effects of subjective norms in non-mandated technology usage behavior showed that subjective norms had no significant effects on user acceptance of new technologies in voluntary environments (Davis et al. 1989). Behavioral intention was also not used in this study because the research focus is on actual usage behavior rather that intention. The conceptual model and previous studies, therefore, inform the selection of the explanatory factors for this study.

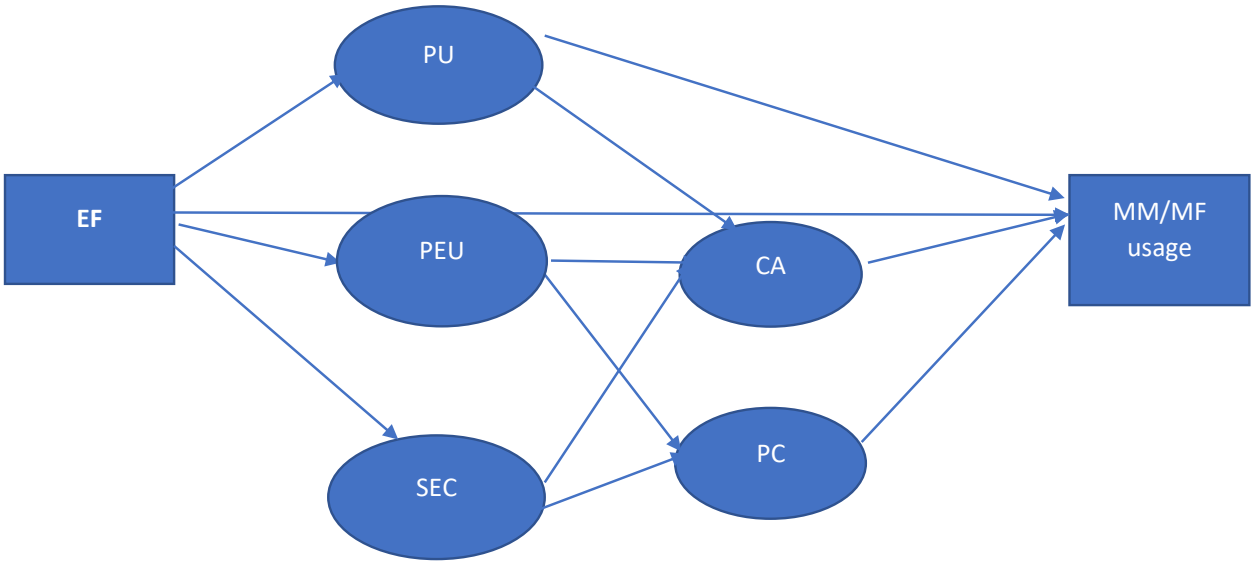

Figure 2.5 *Conceptual model of mobile money/microfinance usage behavior adapted from TAM and TPB*

Hypotheses

The following hypotheses will be tested to determine the relationships between external factors, perceived usefulness, perceived ease of use, security and privacy concerns, consumer attitudes and perception of control, and mobile money and microfinance usage.

H_1: Mobile money usage is significantly associated with external factors such as socioeconomic characteristics, bank account status, and proximity.

H_2: Mobile money usage is significantly and positively associated with perceived usefulness and mediated by consumer attitudes and perceived control.

H_3: Mobile money usage is significantly and positively associated with perceived ease of use and mediated by consumer attitudes and perceived control.

H_4: Mobile money usage is significantly and positively associated with confidence in the security and privacy of the system and mediated by consumer attitudes and perceived control.

H_5: Microfinance usage is significantly associated with external factors such as socioeconomic characteristics, bank account status, and geographic location.

H_6: Microfinance usage is significantly and positively associated with perceived usefulness and mediated by consumer attitudes and perceived control.

H_7: Microfinance usage is significantly and positively associated with perceived ease of use and mediated by consumer attitudes perceived control.

H_8: Microfinance usage is significantly and positively associated with confidence in the security and privacy of the system and mediated by consumer attitudes and perceived control.

H_9: Microfinance usage and mobile money usage are associated.

Summary

This study employs a mixed methods approach grounded in the previous studies and theoretical models reviewed. An ecosystem model is adapted which suggests that it is important to obtain perspectives from both providers and end-users of mobile money and microfinance. With the aid of the conceptual model, the study predicts consumer usage behavior based on their perceptions of the usefulness, ease of use, and confidence in the security and privacy of the system, and the mediating effects of the consumer's attitude and perceived control, while controlling for external factors. The dependent variables ask whether the consumer had used the mobile money service and microfinance service for specific forms of transactions over the past 60 days respectively. The existing literature and theoretical models reviewed indicate that there are unique factors that influence adoption of each type of service. However, it has been found in other similar countries that mobile money and MFI operations intersect, but the literature for this for the case of Ghana is particularly lacking. This study addresses this gap while expanding the knowledge about the ecosystem and effectiveness of non-traditional financial services in Ghana.

CHAPTER 3

METHODS AND PROCEDURES

The purpose of the research is to examine the use and impact of mobile money and microfinance simultaneously, to determine which factors influence their use, and to identify their separate and complementary impact on financial inclusion in Ghana. The study employs a mixed methods approach that combines both qualitative and quantitative analyses to present a comprehensive analysis that explores the perspectives of the key players involved in the financial inclusion partnership. The qualitative method is used to present detailed descriptions of the bank, MNO, MFI, agent and consumer case studies, and the quantitative method is employed to analyze the consumer survey data. I employ a convergent parallel mixed methods approach where the qualitative and quantitative data was collected at the same time and integrated into the interpretation of the overall results (Creswell, 2014). Exploring both service provider and user perspectives provide an in-depth understanding of the environment and the intersections between the parallel services in relation to financial inclusion in Ghana.

Qualitative Methods

The in-depth inquiry and analysis of multiple cases is grounded in the ecosystem model where key stakeholders of mobile money and MFIs were interviewed. Five distinctive case studies are presented on the bank, MNO, MFI, agent and consumer experiences, respectively. The collective or multiple case study is the appropriate approach here as it effectively presents different perspectives on the financial inclusion issue. In a collective case study, the inquirer investigates an issue or concern by purposefully selecting multiple cases to show different

perspectives on the issue (Creswell, 2007). Data collection for the case studies draws on multiple sources of information, such as interviews, participatory observations, and written documents and the analysis focuses on providing detailed descriptions of the cases, and themes within the cases as well as across the cases. Emerging common themes and overlaps were then analyzed in order to understand the complexity of the cases. Detailed descriptions of key aspects of mobile money and microfinance such as products and services available, and successes and challenges relating to policy and regulation, infrastructure, security and privacy, and marketing are presented.

Participants

Participation in the study was based on the purposeful sampling method which entails the recruitment of informants who could provide detailed information (Barbie, 2001). The key informants identified for the study are representatives from traditional banks, MNOs operating mobile money services, and MFIs, as well as agents and consumers. The participants included one representative each from four selected commercial banks, three of the four MNOs in Ghana who currently provide mobile money services, three selected MFIs, and three agents. Participants from three consumer focus groups were also included.

Formal requests for interviews with bank representatives were made to six randomly selected banks with main branches or headquarters in Accra. The banks were selected from a list of 35 commercial banks on the website of the Bank of Ghana by assigning random numbers and selecting every sixth bank on the random list. The initial requests were made through friends and acquaintances who either worked at the branch or knew someone else who worked at the bank. This approach was used because having a direct contact at an organization or institution always helped to ensure agreements to participate. Four of the six banks agreed to participate. Interviews

were conducted between June 4th and 24th in 2017. Two of the interviews were conducted in person and audio-recorded and the other two were completed over the phone and supplemented with written documents. The interview script used for the bank interviews is enclosed in Appendix A.

Formal requests for interviews were also sent to all four mobile money operators between May 22nd and 31st, 2017. Three providers agreed to participate and interviews with their representatives were conducted between June 1st and 16th, 2017. The fourth MNO declined the interview due to concerns about proprietary information. Two of the three interviews were audio recorded with additional notes taken with the help of a research assistant. Notes were taken by the researcher for the interview with the third MNO and supplemented with written responses provided by the representative since the permission for audio-recording was declined. The semi-structured interviews lasted for about 45 minutes to one hour and involved the use of an open-ended script (Appendix B).

Three MFIs were selected from the online registry of the Bank of Ghana and in-person requests for interviews were made with branch representatives between June 5th and 20th, 2017. The institutions were selected to represent the three hierarchical tiers of the microfinance sector with one representative for each tier. Two of the interviews were completed in-person and audio-recorded, and the third interview was partially done in-person and completed over the phone. Notes were taken for the third interview and supplemented with written documents since the permission for audio-recording was declined. The MFI interviews were conducted between June 12th and 27th, 2017 and the interview script is enclosed in Appendix C.

Three mobile money agents were also selected to participate in the study based on their location and type of operation. The first agent operated a store-front service in a low-income, high-illiteracy, high-density community. The second agent operated a store-front service at a local market in a moderate income, medium density community, and the third agent operated a small table-top service in a moderate income, medium density residential community. An interview date and time was scheduled after the initial introductory visit with two of the agents, and the third agent was interviewed on the same day of introductory visit. All the agent interviews were conducted between June 10th and 30th 2017, following an open-ended agent interview script (Appendix D) and were audio-recorded with their permission.

Three focus group discussions were conducted at different locations in the city of Accra namely Mamprobi, Accra central, and Makola market, between June 10th and 30th, 2017. The locations were selected to increase the probability of recruiting respondents from diverse backgrounds. Mamprobi is a predominantly low-income, high illiteracy, high density community and was selected to reflect the low to moderate-income, less educated consumers' perspective. Participants in this session were initially approached at a social event in the community and requested to voluntarily sign-up for the meeting at a given time and place. Five participants (two males and three females) signed-up for the session but one male participant did not show up for the discussion. The central business district of Accra is also surrounded by typically low-income, high-density communities. However, participants at this location were members of a small group at a church with an estimated 2000 active members from very diverse backgrounds and communities in and around the city. A member of the church administration was initially contacted about the research and the contact information for a small group leader was provided after prior notice from the member. Five participants were recruited for this session which was

held during the weekly group meeting at the church premise. Makola market is the largest local market in Accra with more than 5000 traders ranging from hawkers, small table-top sellers, small shed traders, small stall traders, and shop owners, and have unit/group leaders. One of the unit leaders was approached to help with recruiting participants for the focus group discussion. Five market women volunteered to participate in the focus group session following the unit leader's request. The participants who were initially recruited included a male trader who declined to participate and was replaced with another female participant. Typically, markets in Ghana have about 98% women traders and therefore having an all-female focus group in a market location is not surprising.

There were four or five participants in each group and each session lasted for approximately one hour. The discussions were facilitated by the researcher with an assistant to help with approved video/audio recording and note-taking. A semi-structured script was used for the discussions (see Appendix E). The discussions were primarily conducted in one of the two predominant local dialects in the area (Ga/Twi) based on the participants' preferences to allow consumers to express themselves freely. Each group discussion began with a brief introduction on the purpose of the study and intended uses of the data.

Data Collection Instruments

Qualitative data for the bank, MNO, MFI, and agent case studies were collected by means of one-on-one in-person or phone interviews while consumers were interviewed through focus groups. The interviews involved the use of semi-structured open-ended questions to elicit views and opinions from the participants (see Appendices A- E). The interview scripts were developed by the researcher based on concepts drawn from previous literature on mobile banking/mobile money transfers and modified to fit the objectives of the study and Ghanaian

context. An interview protocol was also followed to ensure consistency of the data collected and procedures for recording data. The protocol used included the project description, an introduction of the interviewer, consent agreement, and participant profile questions, followed by the interview questions. Interviews were audiotaped and transcribed with additional notes taken to corroborate with the transcripts.

Analyses

Data collected from the interviews were used to generate case studies with detailed descriptions of the mobile money and microfinance ecosystems in Ghana. The analysis followed the step-wise procedure for case study analysis and representation as outlined by Creswell (2007). Transcription files were created for organization and initial coding and described in context using categorical aggregation to establish themes and patterns. The data were interpreted in the general context of the research focus, and in-depth cases presented using narratives and illustrations showing participant profiles and interrelationships between themes.

Reliability and Validity

Qualitative reliability generally implies consistency across research procedures and projects. By developing and following a standard interview protocol, I ensure that the data collection procedures are consistent across all the cases. Creswell (2014) recommends that researchers identify and discuss one or more reliability and validity strategies as a procedural check for accuracy of their findings. Multiple validity approaches were therefore incorporated to ensure that the findings of the case studies are accurate from the point of view of the researcher, the participants, and research audience. First, by presenting various perspectives on the issue of interest, the results are more realistic and richer and add to the validity of the findings. Secondly, triangulation of existing literature was employed to build coherent justification for the themes.

Finally, the analysis presents information that builds the case for the themes as well as that which contradicts the general perspectives of the themes. Presenting both supporting and contradictory evidence ensures a more realistic and valid narrative.

Quantitative Methods

The quantitative analysis is employed to test the hypothesized relationships discussed in Chapter 2. Cross-sectional survey data from a sample of 280 respondents is used for the analysis. The survey methodology is appropriate because it allows for the flexibility of developing questions that pertain to the specific issue of interest and the possibility to make descriptive and explanatory assertions about a large population based on a selected sample and a standard questionnaire (Barbie, 2001; Creswell, 2007). The data was collected by means of in-person (paper) and online surveys to have a broader participant reach over a short period of time and to ensure an acceptable response rate.

Population and Sample

Ghana has an estimated population of about 27 million with a mobile phone penetration rate of over 100% as of April 2016 (36.4 million users with some individuals having multiple subscriptions). However, almost 70% of the adult population is excluded from formal banking, and about 25% are excluded from the financial sector (PwC, 2016). The target population for this study, therefore, is adult mobile phone users who may or may not be mobile money and/or microfinance service users. Data was collected in the capital city of Accra and surrounding areas to facilitate easy access to service providers and consumers. Accra is also the most populous city and the most representative of the overall population of Ghana. Individuals were randomly approached at local markets, shopping malls, local government offices, and churches and requested to complete the survey. The markets and shopping malls were selected based on

geographic location to represent inherent income, education and social class status within the population. The geographic stratification is appropriate because physical access (proximity) is an important indicator of financial access. A total of 264 paper responses and 52 online responses were collected of which 240 and 40 responses, respectively, were usable after accounting for incomplete responses. A final sample size of 280 responses was used for the quantitative analysis.

The Survey Instrument

A closed-ended questionnaire was developed by the researcher as the primary data collection instrument. The questionnaire has sections on socioeconomic, demographic, and proximity, bank account ownership, saving and borrowing behavior, consumer perceptions and usage of mobile money and microfinance services. The key question items were drawn from components of existing instruments from the Federal Deposit Insurance Corporation (FDIC) and the Global Findex database and modified to suit the specific context of the study. The FDIC household survey of the unbanked and underbanked questionnaire contains 51 questions on use of financial services (Burhouse et al., 2014). Findex is the World Bank's Global Financial Inclusion database, which provides 800 country-level indicators of financial inclusion in over 140 economies on saving, borrowing, payment methods, and risk management behaviors (Demirguc-Kunt et al., 2015). Questions that specifically relate to mobile money (MM) and microfinance (MF) usage were generated from the general questions on financial services/products, and questions that highlight consumer perceptions and attitudes were developed by the author to suit the economic, social, and cultural contexts of Ghana. The survey questionnaire is attached in Appendix F. Table 3.1 provides a summary of the question items and

the sources of the items. Measures taken to ensure validity and reliability of the survey instrument are discussed under the preliminary analysis section.

Table 3.1 *Question Items and Sources*

Question Items	Scope/Context	Source
1 – 6	Banking status	Modified from FDIC household survey
7 - 17	Saving, borrowing, MM accounts and uses, proximity	Modified from Findex database
18 (Ya1 – Ya14)	Indicators for latent factors (MM)	Developed by author based on conceptual framework and hypotheses
19 - 22	MF accounts and uses	Developed by author based on conceptual framework and hypotheses
23 (Yb1-Yb14)	Indicators for latent factors (MF)	Developed by author based on conceptual framework and hypotheses
24 - 29	Demographic and socioeconomic	Modified from previous studies

Variables

The variables for the analysis were selected following the research questions and conceptual model. The dependent variables were mobile money usage and microfinance usage respectively. Mobile money usage was measured specifically as payment for goods and services, sending or receiving money (remittance), and saving (holding money for at least 3 months) for a specific purpose, with a separate model for each usage type. Microfinance usage was also measured separately as borrowing, saving, and investing (higher interest product held for six months or longer) at an MFI/SLC. The dependent variable for each model is a binary outcome which takes a value of 1 for "yes" (if the respondent has used the specific service at least once in

the past 60 days) or 0 otherwise. The independent variables for both the mobile money and microfinance usage types were external factors, and perceived usefulness, perceived ease of use, security and privacy concerns, consumer attitudes, and perceived control. The external factors included demographic, socioeconomic, proximity and account status variables. Perceived usefulness (PU), perceived ease of use (PEU), security and privacy concerns (SEC), and consumer attitudes (CA) each had three item proxies and perceived control had two. Each item was measured on a five-point Likert scale basis with 1 being strongly disagree and 5 being strongly agree. The survey codebook is attached in Appendix G.

Preliminary Analysis

Missing data

There were two distinct types of missing data identified in this research. The first type was systematic missing data from skipped questions which did not apply to all respondents. The responses from these variables were only used for descriptive purposes and did not require any treatment. The second type was missing data due to non-response and was analyzed to determine the pattern, proportion and appropriate treatment. Of the 30 variables used in the overall analysis, nine had missing observations and were determined to be missing at random. Education, employment, and marital status had two (0.7%) missing observations each, household income had 15 (5.2%) missing observations, and five microfinance factor items had four (1.4%) missing observations. Generally, data that is missing at random and less than 10 percent of the sample is considered ignorable and can be deleted from the sample (Hair, Black, Babin, & Anderson, 2010). However, with the relatively small sample size for this study, using only the complete cases may lead to a significant reduction in sample size and consequently power. The missing observations were therefore imputed using the Last Observation Carry Forward (LOCF) method,

which replaces the missing values with the value adjacent to the missing value. LOCF is often the preferred method of imputation when responses are uniform, and the proportion of missing observations is low, and because of its ease of use (Cox, 2012; Graham, 2008; Hair et al., 2010). LOCF is a single value imputation approach which may underestimate the variance and produce biased inferences particularly with deterministic imputations (DePuy, 2005; Hedeker, Mermelstein & Demirtas, 2007). However, Roth (1994) reviewed previous literature on missing data and concluded that if the missing observations are random and the proportions of missing observations are very small (e.g., 5% or less), then it may not matter what method is used to replace missing observations.

Multivariate normality

Multivariate normality was tested using the Doornik-Hansen test for multivariate normality which is based on the skewness and kurtosis of multivariate data that is transformed to ensure independence. The DH test is more powerful than the Shapiro-Wilk test for most tested multivariate distributions and tests for both multivariate and univariate normality (Doornik and Hansen 2008). The DH test was significant (chi2(28) = 661.087, Prob>chi2 = 0.0000) and therefore rejected the null hypothesis that the underlying population is normal. Generalized structural equation modeling (GSEM) however, does not assume multivariate normality and is more suitable for generalized responses (binary, ordered, count) and multilevel data structures (Huber, 2013). Binary outcome variables follow the Bernoulli distribution for which the normality test is not required and therefore no treatments were required to correct for non-normality. Establishing normality was only necessary for conducting the initial exploratory and confirmatory factor analysis in structural equation modeling (SEM).

Reliability and Validity

Reliability and validity of the instrument were established during data collection and analysis. Following the review and approval by the research committee and Institutional Review Board, the online version was pilot tested with 14 participants to establish content validity. Comments and responses from the pilot test indicated that the survey was simple and easy to complete. An error was detected with one question that stated the option to select multiple responses though the set-up did not allow multiple selections and this was corrected by removing the multiple selection option. Correlation matrices were obtained for the 14 items for the mobile money and microfinance models separately (Appendix H). The mobile money items had an average interitem correlation of 0.3917 and a scale reliability coefficient of 0.9002. The microfinance items had relatively higher average interitem correlation of 0.6548, but multicollinearity issues were not anticipated given the high scale reliability coefficient of 0.9437. A confirmatory factor analysis was run with the 14 items in a five-factor measurement model. All the items had moderate to high factor loadings (> 0.4) and showed nearly acceptable model fit indices. However, the (GSEM) did not converge for the five-factor model and modification indices did not show any significant improvement for model fit. An exploratory factor analysis conducted suggested a three-factor model when the factors were unrotated, and a two-factor model with 10 items loading on one factor with an oblique rotation. Both models only converged for two of the six models and the GSEM analysis was therefore terminated. The indicator variables were therefore used as separate independent variables in a series of logistic regression models to test the hypotheses of the study. Ten of the 14 items were used in addition to the ten external variables after dropping four items with high interitem correlations to reduce the possible effects of multicollinearity and redundancy.

Analyses

Data analyses were conducted using a series of binomial logistic and multinomial logistic regression models where the predicted value of the outcome variable is forced to range between 0 and 1. The binomial logistic regression is selected as the statistical approach based on the binary dependent variable. Logistic regression does not require any specific distribution forms of the independent variables and is also more robust to violations of the strict multivariate normality and equal variance assumptions of multiple regression. The formula for binomial logistic regression is given as:

$$ln\ Y/(1-Y) = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta \eta X\eta + \varepsilon, \qquad \textit{Equation 1}$$

where:

Y represents the dependent or outcome variable, Xi…, Xn represents the independent variables, and β0 represents the intercept, or the log odds of y being equal to 1 when the value of Xi equals zero.

The empirical model that examines the relationship between external variables, consumer perceptions and attitudes and mobile money usage is given as:

$$MM_{1,2,3} = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta \eta X\eta + \varepsilon, \qquad \textit{Equation 2}$$

where:

$MM_{1,2,3}$ = Mobile money used for (1) payments; (2) remittance; or (3) saving

X_1= External variables such as education level; income; gender; employment status, and geographic location.

$X_{2, \ldots} X_{\eta}$ = Perception and attitude factors including perceived usefulness, perceived ease of use, security and privacy concerns and consumer attitudes and perceived control as mediating factors.

A multinomial outcome variable was generated from a combination of the response variable $MM_{1,2,3,}$ to create four categories of non-users, single-users, and multiple-users, 0, 1, 2, 3. The multinomial model therefore predicts the probability of belonging to the non-users (0), or multiple-users (2, 3) group, versus the single-users (base group) based on the given set of independent variables explained in equation (2). The multinomial model is therefore given as:

$$MM_4 = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta \eta X\eta + \varepsilon, \qquad \textit{Equation 3}$$

where:

MM_4 = 0, 2, 3 for no use, two services, and all three services, respectively.

The model that examines the relationship between external variables, consumer perceptions and attitudes and microfinance usage is given as:

$$MF_{1,2,3} = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta \eta X\eta + \varepsilon, \qquad \textit{Equation 4}$$

where:

$MF_{1,2,3}$ = Microfinance used for (1) borrowing; (2) saving; (3) investing; and $X_{1 \ldots} X_{\eta}$ representing the same set of independent variables used for the mobile money model. Saving here typically involves making small daily/weekly deposits for a given period and withdrawing the total amount saved at the end of the period.

CHAPTER 4

RESULTS AND DISCUSSION

The purpose of this research is to examine the use and impact of mobile money and microfinance services simultaneously, to determine the factors that influence their use, and to identify their separate and complementary impact on financial inclusion in Ghana. The results presented in this chapter begin with a qualitative analysis built on the mobile money ecosystem model, followed by a quantitative analysis built on a conceptual model with components of TAM and TPB. The qualitative results follow the case study approach to present descriptive narratives reflecting the perspectives of selected key players of the ecosystem model which includes banks, MNOs, MFIs, agents, and consumers. The quantitative analysis presents descriptive statistics and logistic regression analyses from a separate consumer survey sample of 280 respondents.

Qualitative Analysis

The Traditional Bank Perspective

This section summarizes the responses of representatives from the four commercial banks that participated in the study as service providers. The participating banks had practically uniform financial products but differed in terms of ownership (private, government, domestic, or international), years of operation, number of branches, and mobile money partnerships. The representatives responded to questions relating to banking products and financial inclusion strategies, mobile money partnerships and integrated products, and challenges with financial inclusion and mobile money services. A summary of key characteristics of the banks is presented in Table 4.1, followed by a discussion of responses and summary of emerging themes.

Table 4.1 *Description of Participating Banks*

	Bank 1	Bank 2	Bank 3	Bank 4
Ownership	Private (domestic)	Private (domestic)	Private (domestic)	Private (international)
Years in operation	10	16	11	2
Number of branches	200+	50+	50+	5
Mobile banking portal	Yes	Yes	Yes	Yes
Mobile money roles	Partner, retail agent	Partner, retail agent	Partner, retail agent	None
MM integrated services	account integration, agent/merchant e-payments	account integration, agent/merchant e-payments	account integration, agent/merchant e-payments, savings, card-less ATMs	None

As shown in Table 4.1, Banks 1, 2 and 3 are all privately owned domestic banks and have been in operation for 10 years or longer while bank 4 is a privately owned international bank and a new entrant in operation for only two years in Ghana. While Bank 1 has the most branches and is the most remotely penetrated, most of the branches in the remote regions are considered express locations (small stall offices with one supervisor and one or two tellers) rather than full branches. Banks 2 and 3 both have over 50 full branch locations across the country with their headquarters located in Accra, and Bank 4 has 5 branches all located in Accra.

All four banks also have mobile banking portals that allow customers to access their bank accounts on their mobile phones using SMS codes. Additionally, Banks 1, 2, and 3 are mobile money partners providing both float management and retail services through account integrations while Bank 4 is neither a partner nor retail bank. For Banks 1, 2, and 3, the common integrated products are account to wallet/wallet to account transfers, which allows consumers to

push and pull money between their bank account and mobile money accounts (m-wallet), and agent/merchant wallet transactions. Mobile money agents and retail merchants can visit any partner bank branch and transfer cash in and out of their merchant wallets regardless of whether they have an account with the bank or not. In addition to the customer m-wallet and merchant wallet/retail services, Bank 3 also offers a specialized mobile money savings account, and card-less ATM withdrawals for mobile money account holders. These products will be discussed in detail under the mobile money integration sub-section.

Financial inclusion issues and strategies

The bank representatives addressed questions about financial inclusion strategies, banking needs of the unbanked, efforts to address these needs, and challenges reaching the unbanked. All the participating banks recognized the importance of financial inclusion to the development of the financial service sector and the Ghanaian economy. Generally, bank representatives agreed that the ability to meet the documentation requirements for account opening which included proof of ID, proof of residence, and income or employment verification is a primary challenge for unbanked consumers. To address this need, most banks have relaxed the ID requirement to include flexible options like voter registration ID, health insurance card, school ID card, and passport size photo attached to a signed letter from a local community official. As one of the interviewees stated, "... a student that has been accepted into a college can bring a passport photo attached to the admission letter as proof of ID to open an account before enrollment" (Bank 2, personal communication, June 2017). Another bank representative also added that "… income and employment verification documents are not required for basic savings account but are necessary for investment and loan accounts" (Bank 3, personal communication, June 2017).

Other important banking needs identified by the banks were proximity to branches, small amount deposit needs, consumer convenience, credit worthiness, and liquidity constraints. Except for the new entrant (Bank 4), all the other banks have branches in the city as well as in remote rural locations. Bank 1 for instance, has more small branches and express locations in low density/low income rural areas, and in high density/low income urban communities than any other bank in the country. The representative stated, "…we have been very successful at being the people's bank because we have gone to the deeply remote areas where any other bank wouldn't go" (Bank 1, personal communication, June 2017). Another representative noted, "bank branches can now be found in residential communities, shopping malls, local markets, and transportation hubs. They are not all clustered in the central business districts and main streets of big towns like they used be 10 years ago" (Bank 3, personal communication, June 2017).

Also, Banks 1 and 3 use field agents to reach consumers at their workplaces, (particularly at local markets) to facilitate daily/weekly convenient deposits without having to make a trip to the bank branch. The key highlights of Bank 3's financial inclusion strategies are the new point of sale (POS) system specialized accounts and the agency banking system. The POS accounts allow field agents to open and manage specialized small deposit accounts by visiting prospective clients at the farm, market, and shop/business location. The agency banking system also allows customers to make deposits and withdrawals from a registered (mobile money) agent location. The registered mobile money agent must also be a registered bank agent who is trained to handle only the specialized account, and these accounts usually have restricted transaction terms such as service charges and limited number of withdrawals per month. In effect, the field agent, POS, and agency banking systems do not only meet the convenience, flexibility, and small amount transaction needs of unbanked consumers, but also help to promote trust in the banking system as

consumers develop confidence in the agents after several visits. Other needs of concern mentioned were credit worthiness and liquidity constraints which is appeared to be a challenge for the underbanked clients who preferred to use alternative financial services for their saving and borrowing needs. However, for Bank 4, there are no specific strategies in place to reach the unbanked as the target market is primarily high net worth individuals.

Despite the outlined efforts to bridge the financial inclusion gap, bank representatives indicated that competition and ecosystem of cash transactions, as well as consumer mindsets and preferences were the primary challenges. Competition was identified by all four banks as a challenge to reaching unbanked clients because all the banks offer the same core products and are fighting for the same customers. As one of the representatives indicated, "we are all going after the same customers with the same products so we are constantly trying to make our products uniquely suitable for the consumer's need" (Bank 2, personal communication, June 2017).

Consumer mentality and ignorance were also mentioned as challenges. For example, "most consumers think they need huge amounts of money to be able to deal with the bank and it is difficult to change these mindsets" (Bank 2, personal communication, June 2017). To overcome this issue, some banks have established basic savings accounts with low minimum balance requirements. One representative stated, "Our basic savings accounts have very low minimum balance requirements ($1.25) and that makes our bank attractive to low income clients who may have felt like they didn't have enough money to open a bank account" (Bank 1, personal communication, June 2017). In addition, bank representatives agreed that Ghanaians have a general preference for cash transactions and rarely use banking services outside of cash deposits and withdrawals.

Mobile money integration

Banks 1, 2, and 3 are all mobile money partners with bank account to m-wallet integrations enabled by both apps and USSD codes. These services allow mobile money account holders to link their bank accounts to their mobile wallets for transfer and payment services, as well as specialized savings and investment products. Bank 3 for instance has a specialized mobile money savings account that requires an initial minimum transfer of $1.25 (GHC 5.00) from the mobile money account and no additional ID or forms required. The account earns 12% interest annually and can only be accessed through one's mobile money account. Additionally, Bank 3 provides card-less ATM services which allow mobile money account holders (regardless of bank account status) to make withdrawals from their accounts at various ATM locations.

Bank representatives generally indicated that mobile money presents more of an opportunity than a threat to the traditional bank. Even for Bank 4, which is currently not a mobile money partner, mobile money is still recognized as an opportunity to reach the unbanked as it provides a platform for low cost banking.

> Mobile money really complements banking services… it helps with mobilizing funds, decongesting banking halls, and fast liquidation of cash. There is value in the service for the client as well as the provider so it definitely presents a big opportunity and complements banking services (Bank 3, personal communication, June 2017).

However, in relation to its regulation, one representative stated: "mobile money is growing so fast and we can't predict what will happen next… I think regulation is so far behind and seems to be playing catch-up with the system" (Bank 2, personal communication, June 2017). The other representatives also added that, the regulators need to pay more attention to

issues such as interoperability, transaction limits, and uniform pricing. The bank representatives also added that the MNOs will need to improve their network and infrastructural capacity to maintain efficiency of the service.

Summary. The key themes that emerged from the bank interviews were lack of KYC documentation and convenience as barriers to financial inclusion, mobile money as an opportunity, and the need for improved regulation of mobile money. While most banks have relaxed documentation requirements to provide flexible and convenient banking options, challenges with consumer mindsets and preference for cash, as well as competition from other banks and cash systems remain as barriers. Additionally, network and infrastructural challenges were also identified as barriers to the efficient development of the mobile money system.

The Mobile Money Operator Perspective

Three of the four mobile money operating MNOs participated in the service provider interviews. All the three MNO representatives were reluctant to provide information on the number of registered and active users and agents, as well as mobile money market share data as those were considered proprietary information. Additionally, some specific operational data provided was requested be used only in narrative or aggregate form without identifying the service provider. This section presents the perspectives of the MNOs which were arbitrarily labeled 1, 2, and 3. Table 4.2 provides a summary of the basic products, key partners, product integrations, and primary incentives for providing financial services as a telecommunication company.

Table 4.2 *Summary Characteristics of Mobile Network Operators*

	MNO 1	MNO 2	MNO 3
Basic Products	cash-in/cash-out, cash transfers, bill payments, utility payments, purchases, mini statements,	cash-in/cash-out, cash transfers, bill payments, utility payments, purchases, mini statements,	cash-in/cash-out, cash transfers, bill payments, utility payments, purchases, mini statements,
Frequently used product	cash-in/cash-out	cash-in/cash-out, transfers	cash-in/cash-out
Partnerships	Banks, payment companies, insurance companies, SLC/MFI	Banks, payment companies, insurance companies	Banks, payment companies, insurance companies, SLC/MFI
Product Integrations	Bank to wallet, insurance, gov't payments, utility/merchant payments, Card-less ATM services, SLC/MFI services	Bank to wallet, insurance, gov't payments, utility/merchant payments	Bank to wallet, insurance, gov't payments, utility/merchant payments, Card-less ATM services, SLC/MFI services
Primary Incentive	Financial inclusion, product innovation, customer convenience	Financial inclusion, drive for cash-lite society	Financial inclusion, product innovation, customer convenience, flexible products

As shown in Table 4.2, all the three mobile money service providers have practically uniform basic products and frequently used services, as well as partnerships and integrated products. However, MNO 2 currently does not have any partnerships or integrated products with SLCs/MFIs or integrated ATM services. The primary incentives for the MNOs to engage in providing financial services as indicated by all three representatives were to drive financial inclusion and product innovation, increase customer convenience, and promote a cash-lite society. As one of the MNO /representatives stated: "with mobile money we have a product that is convenient, flexible, affordable and easily accessible" (MNO 3, personal communication, June 2017).

Mobile money success factors

The MNOs shared the notion that strategic partnerships and agent network developments were the key factors that have promoted the success of mobile money. These partnerships which include banks, government and private payment companies, and third-party aggregators have helped to facilitate efficient and cost-effective payments and transfer portals. Additionally, the agent network development has made the service easily accessible to the masses and therefore provides a convenient and less expensive option for financial services. Besides, customer relations also play an important role because almost every Ghanaian has an existing relationship with an MNO and therefore the service builds on the trust and confidence of clients. Other factors that were indicated were price stability and service affordability, community engagements, relevant products and robustness of the platform.

Mobile money ecosystem challenges

Generally, MNO representatives agreed that a lot of progress has been made with the development of the mobile money ecosystem and particularly following the release of e-money issuer guidelines by the Bank of Ghana in 2015. However, a key challenge in relation to regulation involves the slow push for interoperability by the Central Bank. The need for interoperability is shared by some but not all the MNOs and banks. Additionally, there are restrictions on transaction limits and pricing which were also dictated by the Central Bank with little to no consultation with the MNOs. Another key challenge area is network and technological capacity. The absence of basic infrastructural systems in most remote communities presents a dire challenge. However, each of the MNOs stated that efforts are being made to develop a more flexible system and an improved network capacity to meet the high volumes of transactions.

Consumer awareness on the basic procedures and service options is also quite low because the MNOs have focused more on agent network developments without paying much attention to consumer education. According to one representative,

> When we (MNOs) got the permission to run mobile money services our strategies were more focused on reaching scale and we went on to signing up as many agents as quickly as possible, without providing our customers the needed education on the basic procedures and service options to facilitate active usage (MNO 1, personal communication, June 2017).

Another representative indicated that the customers' lack of awareness and education on how to use the services have created an over-the-counter transactions system where customers either rely on agents to manage their m-wallets or make basic transactions through the agents' merchant wallets. With most mobile money consumers being uninformed, consumer fraud appears to be on the rise, particularly for older and less educated consumers. Mobile money fraud issues identified include agents overcharging for services, unauthorized withdrawals with compromised pins, and mobile money scams. MNOs have therefore taken a step back to educate consumers on transaction fees, keeping their pin codes secured and steps for pin resets, as well as how to detect and report scammers.

Summary. The first key theme that emerged from the MNO interviews was the important role of mobile money in driving financial inclusion. Financial inclusion and consumer convenience were mentioned as the primary incentives for the MNOs engagement in providing financial services. The second key theme was the important role of strategic partnerships and agent networks in expanding products and reach of the services. Finally, challenges with the

push for interoperability regulation, network capacity, consumer education and fraud were identified as the primary areas of concern.

The Microfinance Institution Perspective

This section presents the perspectives of microfinance finance service providers on the role of the MFIs in the mobile money ecosystem development and their simultaneous impact on financial inclusion. One representative from each of the three hierarchical tiers participated in the study. Table 4.3 presents a summary of the classifications, basic products, mobile money integrations and challenges of the participating MFIs.

Table 4.3 *Summary Characteristics of Microfinance Institutions*

	MFI 1	MFI 2	MFI 3
Classification/Tier	Savings and loans company/1	Microfinance company/2	Micro-credit/money lending/3
Branches/reach	25/6 regions	1/Accra	10/Accra
Basic Products	Savings, specialized accounts, loans, group lending, fixed deposits, treasury bills,	Savings, specialized accounts, loans, fixed deposits	Personal loans, working capital loans
Other services	ATM services, mobile banking, biometric services	Mobile banking Payment services	N/A
Mobile money integrations	Wallet integrations (transfers, deposits, loan payments, air time)	Wallet integrations (transfers, deposits, loan payments, air time)	N/A
Challenges	Network failures, fraud, slow customer adaptation	System failures, consumer attitudes	Consumer attitudes, inconsistent cash flows

As shown in Table 4.3, MFI 1 is a savings and loans company (SLC) with a wide regional reach and bank-like products, integrated mobile money services, as well as ATM and mobile banking services. MFI 2 which is a middle tier deposit taking microfinance company, also has bank-like products except for treasury bills, but with only 1 branch located in Accra. Both providers use app-based and USSD code-enabled mobile banking portals to facilitate their mobile banking, and mobile money wallet to account integrated services. MFI 3 however, is a non-deposit money lending company with 10 branches in Accra, and provides only personal and working capital loans. Personal loans require a guarantor and proof of income or employment. Working capital loans also require a guarantor and business license and are only issued for existing businesses.

Impact on financial inclusion

All three MFIs specifically target lower to moderate income individuals (rural and urban poor), and less educated, unsophisticated consumers who require little documentation, and low fee convenient deposits and credit products. Their product lines therefore include flexible, small amount and customized savings and loan products which are particularly appealing to inconsistent income earners like small business owners, traders, and contract workers. The depository MFIs typically require three to six months of saving with the company, a counseling session, a guarantor, and proof of employment/income prior to the approval for a loan. Additionally, all three companies make extensive use of field agents who make routine home or workplace visits to collect deposits and loan repayments, which is the added convenience and highlight of the appeal of microfinance services.

> I think we have been very successful in reaching a lot of clients because we use grassroots marketing to reach out to low income individuals, market women and petty

traders and our loans require no deposit accounts and have quick approval rates (MFI 3, personal communication, June 2017).

Mobile money integration

In addition to their individual company's mobile banking platforms, MFIs 1 and 2 have mobile wallet to deposit account integrations through partnerships with three, and all four, mobile money operators, respectively. Wallet to account and account to wallet transfers can be used for air time purchases and bill payments, deposits, loan repayments, and money transfers (remittance). Both providers charge a flat monthly service fee for mobile banking services which includes wallet transfers, deposits, and loan payments. However, transfers between accounts (remittance) and merchant and bill payments may incur a convenience fee per transaction. MFI 3 on the other hand, require in-person branch visits for loan disbursements and weekly loan repayments. This in-person approach is intended to maintain effective customer relations and to serve as a strategy for monitoring consumer behavior and loan default rates. The provider however, accepts mobile money payments in emergency situations through a company registered merchant account. In this situation, the client is required to call the branch and explain the emergency before initiating the transfer, and a transaction fee will be incurred for the payment. When asked if there were any plans for future mobile money integrations, the provider indicated that their core clientele are predominantly older, less educated women with inconsistent income structures that require active credit monitoring to manage loan default rates. Therefore, mobile money as a primary loan repayment option may not necessarily be an efficient and cost-effective mechanism for their business structure.

For the mobile money integrated MFIs, the challenges that emerged were related to poor network and system failures, slow consumer adaptation, compromised pins and unauthorized

transfers, switching providers, and skepticism about fraud. It is important to note that, the consumer behavior challenges mentioned here are all inherent consequences of lack of consumer education, which is shared by all the ecosystem partners. Integrating money mobile and microfinance could present a potential for efficient mechanisms for promoting financial inclusion. However, they are regulatory, technological, and consumer behavioral drawbacks to be addressed for the system to reach scale.

Summary. Similar to the banks and MNOs, MFIs have also focused on convenience and flexibility as the key strategy to attract the masses into the semi-formal financial sector. The bank-like MFIs have also formally integrated their services with mobile money platforms as an added convenience for consumers. However, the representatives indicated that consumer adaptation appears to be very slow as the core clientele for the sector are typically less educated and unsophisticated mobile money service users. Additionally, MFI representatives identified issues related to system errors and network failures, as well as the increasing rate of fraud as the key challenges associated with integrating mobile money services.

The Mobile Money Agent Perspective

This section presents the perspectives of three mobile money agents who participated in the study as part of the service providers. The mobile money agents act as an intermediary between the MNO and the consumer and therefore their responses provide important insights on the direct service delivery issues. The agent interviews were conducted during services operations and were also used as informal participatory observations.

Table 4.4 *Description of Mobile Money Agents*

	AGENT 1	AGENT 2	AGENT 3
Gender	Male	Male	Female
Location	Chorkor	Dansoman market	Laterbiokorshie
Operation type	Store-front	Store-front	Table-top
Years in service	2.5	3	1.5
MNOs served	2	4	2
Other services	Insurance agent, bank agent, internet service agent, air-time scratch cards/transfers	Money transfer agent, internet service agent, government\bulk payments withdrawal agent, daily deposit (susu) agent	Air-time scratch cards and transfer
Pricing Disclosure	Price schedule visibly displayed	Price schedule visibly displayed	Provided upon request
Profitability	OK- depends on customer flow and other services provided	Low- Customers mostly engage in small amount transactions	Relative

Agent narratives

Agent 1. This agent has operated a store-front service for two and a half years with services for two MNOs and was also an auto insurance and bank agent. The agent received a site visit for business certificate and proximity guidelines confirmation, and made an initial wallet deposit of GHC. 2,000 (US$500) for a merchant sim registration for each MNO. He was self-trained using an operational manual provided by the MNOs. He indicated that the core of the training is the same for both MNOs but the processes differ slightly. The price schedules were visibly displayed in the shop but it was observed that customers who visited at the time of interview paid no attention to the schedules or asked any questions about service charges.

In response to the question *how would you rate the profitability of your business and how do you manage client retention,* the agent stated:

> I think it's OK… but it depends on the flow of customers and the other services as well. I also live in this area so I know most of my customers and have built very good customer relations with them. They come in with all sorts of problems with their phones and I help them with that (Agent 1, personal communication, June 2017).

The agent also indicated that the key challenges with his experience as a mobile money agent involve network problems, consumer illiteracy and the high demand for over-the-counter services, and the risk of fraud. He added that "the system requires a lot of attention to detail and it seems like fraudsters have hacked into the system so there is a high risk of loss of funds for both the agent and clients" (Agent 1, personal communication, June 2017).

Agent 2. This agent operated a store-front service and was a registered agent for all four MNOs. The agent has been in operation for 3 years, and had other services like internet modem and recharge credits, bulk payment withdrawals, and daily savings (susu) services. Agent 2 also made the initial wallet deposit of GHC. 2,000 ($500), and received the site visit for proximity checks like Agent 1, at the time of registration with each MNO. However, he also attended a four-hour training/orientation session with his first MNO merchant sim registration and received either an operational manual or verbal on-site instructions for the subsequent registrations. The price schedules were also visibly displayed and when asked about the profitability of the mobile money service, he indicated that profits were relatively low and competition is very keen.

> I think there are too many of us here in the market and the customers usually make small amount transactions… but it's a market so the proximity guidelines don't work because

> only one or two agents cannot handle the high volume of transactions… but six of us is a little too many (Agent 2, personal communication, June 2017).

He further explained that MNOs used either a percentage per transaction or a more complex fee per tier method for calculating agent commissions. For the percentage basis, the agent commission was 50% for a withdrawal (cash-out) and 40% for a deposit (transfer) of every one percent transaction fee charged. The agent also identified network failures and system errors, fraudulent activities, and poor response rates of field officers as the primary challenges experienced as a mobile money agent. He added that, the MNOs need to consider setting up an insurance policy program for the agents to guard them against the risk of loss of funds from robbery and scams (hackers).

Agent 3. This agent operated a small outdoor table-top for two MNOs in a moderate income, medium density residential community. The agent has operated for one and a half years for both MNOs, and sold air-time scratch cards and credit transfers. At the time of the interview, mobile money service was available for only one provider because the other provider had experienced a network downtime for the past 48 hours. The agent only received verbal procedural instructions without any in-person or self-training material before registration. In response to the question about profitability and client retention, she noted,

> It really varies by the day, somedays it's just air-time credits, other days you have more cash-outs, and transfers…but I'm the only agent in the area and I know most of the clients so even when I'm not at the table, some people will come inside the house to ask if I'm available (Agent 3, personal communication, July 2017).

The primary challenges identified by this agent also involved network problems, fraudulent activities, compromised pins, and slow customer adaptation, which conforms to the challenges indicated by the other agents.

Summary. The key themes that emerged from the agent interviews were related to network challenges, fraudulent activities, and lack of consumer education. These issues were also recurring themes in the respective service provider interviews among others such as regulation and competition. Another important theme was related to profitability and the agents' inability to explain how commissions were calculated. Agent commissions are typically paid electronically to their accounts monthly. The methods for calculating commissions vary among the providers and may either be a percentage per transaction or fee per tier basis. One agent could explain the percentage per transaction commissions but none of them understood the fee per tier basis. Additionally, the agents expressed concerns about their personal safety and generally indicated that they usually don't carry too much cash at the shop/stand and closed before dark as a precaution against robbers.

Participatory observation

The researcher observed agents' interactions with consumers and noticed some key issues relating to compliance with KYC guidelines and pricing disclosures. Although KYC guidelines require agents to verify consumer IDs before initiating withdrawals, none of the agents checked IDs at the time of interviews. When asked if they usually checked IDs before transactions, one responded:

> If I have to check everyone's ID, then I'm not being any different from the bank and will be keeping people in long queues. If the customer has the mobile phone in hand to

> confirm the transaction that's enough verification (Agent 2, personal communication, June 2017).

The others generally explained that they lived in the communities and knew most of the clients but they would occasionally verify IDs for large amounts or token withdrawals from a client they don't know. It was also observed that consumers never paid any attention to the displayed price schedules or asked any questions about transaction costs. The agents were therefore asked how they usually explained service charges to consumers. Their responses generally indicated that the consumers already knew the standard charges which were flat rates so they do not usually need any further explanation.

The Consumer Perspective: Focus Group Discussions

The main purpose of the focus group discussions was to understand the deeper associations that underlie consumer characteristics and adoption and use of financial services. The results presented in this session represent the summary responses of three groups of four to five participants who were interviewed at different locations within the city.

Mamprobi Group

All four participants at this session had bank accounts as well as mobile money accounts, one participant had a savings and loan account, and two also participated in informal group savings clubs either with friends and family members, or colleagues at work. Participants in this session have used both formal banks and semi- and informal methods for their saving needs but typically prefer to borrow from family and friends. All four participants in the session have used mobile money to either send or receive more than once in the past month, but none of them have used it for formal payment of goods and services, or for saving money. Additionally, the

participants knew about mobile money integrations such as account to wallet transfers, specialized savings/investment accounts, and micro-insurance products. Two participants were enrolled in hospital (disability) insurance program through their mobile money service providers.

Accra Central Group

Participants at this location were younger and more educated as compared to the other groups. However, two of the five participants were unemployed, had no income, and neither owned a bank account nor a mobile money account. One participant owned a savings and loan account in addition to a bank account and mobile money account, and another participant used an informal daily savings group (susu). The participants were also fully aware of mobile money integrated services and all three mobile money account users had bank accounts that were linked to their mobile money accounts. Additionally, the two participants who did not have mobile money accounts have both used the service to either send or receive money in the past and indicated an intention to register for an account.

Makola Market Group

There were five female participants at this session. All five women had mobile money accounts as well as savings and loans accounts. Four of them also had bank accounts, and three participated in some form of informal savings group. The women were generally much older, less educated, less sophisticated, and passive users of financial services. These participants mostly used their savings and loans accounts for routine deposits and short-term savings, and their bank accounts for longer term savings. They also used their mobile money accounts for routine transfers and withdrawals but were mostly unware of mobile money integrated services.

Summary of participants

There were fourteen focus group participants in total, with the majority being female (71%), between the ages of 18 – 34 years (57%), and having only basic through high school education (57%). Of the participants who were employed and earning an income, 45% were employed by the government and private sectors and 55% were self-employed, while 64% earned between $101 to $250 per month. Income ranges were quoted in the local currency (GHC) and converted to the dollar equivalent (GHC.4: $1 at the time of data collection) when the data was transcribed. Most of the participants used a combination of financial services, particularly bank accounts and mobile money accounts, and some also used semi-formal and informal financial services such as microfinance and daily/weekly (Susu) deposits. Table 4.5 provides a summary of the profiles of the focus groups participants.

Banking services

As shown in Table 4.5, 11 (75%) of the 14 participants had bank accounts. For those participants with no bank accounts, one participant stated: “I am a student so I don’t have enough money to open a bank account” (Accra group participant, personal communication, June 2017). Another respondent also stated:

> I don’t have enough money to open a bank account and since I have a mobile money account, I can send and receive money everywhere without having to wait in long lines or fill out any complicated paper forms so I really don’t need a bank account (Makola group participant, personal communication, July 2017).

Table 4.5 *Summary of Focus Group Participants*

	Mamprobi (Community residents)	Accra Central (Church group)	Makola Market (Traders)	Total
No. of participants	4	5	5	14
Gender				
Male	1	3	-	4
Female	3	2	5	10
Age groups				
18-34 years	3	4	1	8
35-54 years	1	1	3	6
55+ years			1	1
Educational level				
High sch. or less	2	1	5	8
Associate degree	2	3	-	5
College degree or higher		1	-	1
Employment status				
Employee (gov't/private sector)	2	3	-	5
Self-employed	1		5	6
Unemployed	1	2		3
Income				
up to $100/month	1		2	3
$101 - $250/month	2	2	3	7
$250+/month		1		1
Financial services used				
Bank account owners	4	3	4	11
MF/SLC accounts	1	1	5	6
Informal savings group	2	1	3	6
Mobile money accounts	4	3	5	12

All the bank account owners had only savings accounts and indicated that checking (current) accounts require higher minimum balances, monthly direct deposits, and high service fees and thus very costly to manage. Bank account owners frequently used in-branch deposits and withdrawals as well as direct deposits of monthly salaries but very limited use of ATMs, checks, and debit card payments due to additional service charges associated with use of these services.

For instance, some banks charged a service fee per ATM transaction while other charged a flat monthly fee for a given number of transactions per month. Merchants such as restaurants, grocery shops, and retail outlets that accept debit card payments may also charge an added convenience fee. Customers therefore prefer to make routine weekly or biweekly withdrawals from the bank branch and conduct their everyday transactions by cash payments.

Semi-formal and informal financial services

In addition to having formal bank accounts, some participants also used the semi-formal microfinance and savings and loans companies (MFIs/SLCs), and informal savings groups (ROSCAs) and daily deposits (Susu) for their routine saving and borrowing needs. Two of the four participants in the Mamprobi group used informal savings groups either with work colleagues or friends and family in addition to their bank accounts and one also had an account with a savings and loans company. One participant in the Accra central group who did not have a bank account had an informal daily deposit account and another had a SLC account in addition to the bank account. Additionally, all five of the Makola market group participants had SLC accounts and three also participated in informal savings groups (ROSCAs). The primary reasons stated for the use of these alternative financial services for basic saving needs centered around convenience and flexibility. As stated by one participant, "the field agents will come to the market everyday so I don't have to leave my stall and lose any sales" (Makola group participant, personal communication, July 2017).

Borrowing from MFIs/SLCs is considered to be very expensive because the fees and interests are too high and it takes forever to pay off the loans. Of the 14 participants, only one had an active loan with a SLC and three of the market group participants have had previous unpleasant experiences with MFI/SLC loans. One of the participants added that, "their interest

rates are too high and the loans take forever to process so my work savings group loan comes in very handy and I can pay it off in a few months and start over again" (Mamprobi group participant, personal communication, June 2017).

Mobile money services

Mobile money accounts were the most predominant financial service used by the focus group participants with 86% having registered accounts. Also, those with no registered accounts have had experiences using the service to either to send or receive money, and indicated an intention to register for the service in the future (next 6-12 months). Air time top-up and cash-in/cash-out were the most frequently used services. Generally, participants cited convenience and proximity to retail agents as their primary motivation for using the service. "I can find a mobile money agent on every street in Accra and send or receive money very quickly" (Accra group participant, personal communication, June 2017).

Other motivations cited for the preference for mobile money were ease of use, affordability, and time saving. Participants in the Mamprobi and Accra central groups were mostly aware of other available uses of mobile money accounts such as for payment of utility bills and goods and services, salary and government payment disbursements, and bundled (integrated) services like bank to wallet transfers, insurance, and investments. However, the market group participants were mostly not aware of the integrated uses and usually had to rely on the retail agents or younger family members and friends for even the basic uses like air-time top-up and cash-in/cash-out services. Overall, our focus group participants were mostly convenient users of mobile money with 13 (93%) of them using the service in addition to other financial services and one person being totally excluded from the financial sector.

The positive experiences associated with mobile money as indicated by all three focus group participants related to convenience, flexibility, and speed of transactions. As one participant noted, "mobile money is a life saver, on a bad market day I called my daughter who lives all the way in the Northern region and she sent me money immediately through mobile money for food and transportation" *(*Makola group participant, personal communication, July 2017*).* Another participant also stated, "I had to pay my school fees but couldn't get to campus before the deadline, so I used mobile money to pay my fees and avoided the penalty fee" (Accra group participant, personal communication, June 2017). In response to concerns, challenges and negative experiences with using mobile money, the key issues discussed were primarily network failures, fraud and security concerns, transaction costs, and unavailability of funds from agents. "When you need to withdraw money and they tell you the network is down or they don't have enough money then it becomes an inconvenience" (Accra group participant, personal communication, June 2017).

Fraud and security related issues were a major concern for all the focus group participants and particularly, the Makola market group participants. As one participant noted, "many of us here at the market, rely on the agent because we don't understand the processes. It seems like the agent knows everyone's pin code and that puts us all at risk of fraud" (Makola group participant, personal communication, July 2017). Some other concerns mentioned in relation to fraud were lack of trust in the agents and service providers and double-charging issues. One participant stated that, "Mobile money is a very good service but some of the agents are thieves [even some of the service providers (MNOs)]. I don't leave any money in my account anymore because I don't trust them" (Makola group participant, personal communication, July 2017). Another participant added that "when my clients send money to pay for their goods, I have to pay a fee to

get the money even after they have paid the fees to send the money" (Makola group participant, personal communication, July 2017).

It is important to note that the Makola market group participants were generally older and less educated as compared to the Mamprobi and Accra central groups, and were therefore more likely to be easy targets of fraud. The issue of what was considered double-charging was also discussed at all three sessions and it appeared that most consumers did not understand that there was a transfer fee to send money as well as a withdrawal fee for cash-out (receiving). Consumers stressed that they needed more information/education from the mobile network operators to understand not only the pricing, and available transaction options but more importantly the basic processes and how to avoid fraudulent practices.

Mobile money integrations

Focus group participants were also asked about integrated services such as bank account to mobile wallet transfer, micro insurance, mobile microfinance and investment products. Almost all the bank account owners in the Mamprobi and Accra central groups had mobile money integrated bank accounts and had made a bank account to m-wallet or m-wallet to bank account transfer at least once in the last three months. Additionally, one participant had a mobile money investment account, and two participants also had hospital (disability) insurance through their mobile money service provider. The insurance program enrollees explained that very low weekly premiums were deducted from their air time credit for a given daily pay-out per hospital admission. Neither of them had ever filed a claim and could not explain how the process worked but they both indicated that they knew of friends/family members who had made successful claims. Interestingly, none of our MFI/SLC account holders had mobile money integrated accounts and only one participant was aware of the availability of the service for deposits and

withdrawals with the service provider. Yet, again, our predominant microfinance service users were the less sophisticated Makola market group participants, who barely understood even the basic uses.

The key highlight of our discussions on mobile money integrations was the widespread use in the informal context. Almost all the informal savings groups participants from all three sessions have used mobile money at least once in the past month to make their weekly contributions. The market group participants were the most prolific users as they regularly use mobile money to pay for goods (supplies) they have bought on credit and to receive payments for goods sold on credit to their retail clients. Generally, our participants routinely use mobile money to send and receive money as payments for goods and services such as clothes, hair products and salon services, painting, plumbing, catering and transportation services. These informal payments are typically transacted as person-to-person transfers and are therefore not considered as payments on the service provider end. Additionally, the participants indicated that the transaction fees incurred usually compensates for the time and transportation costs saved as well as the convenience and flexibility of paying for goods and services after the fact.

Summary. In general, our focus group participants were convenient users of multiple financial services which included banks, SLCs/MFIs, informal savings groups and mobile money services. Banks are the convenient option for direct deposits of salaries, routine bi-weekly or monthly withdrawals, and longer-term savings. SLCs/MFIs and informal savings groups are the typical options for routine/short term savings, and family and friends or informal savings groups are the preferred choices for borrowing. Mobile money transfer services enable consumers to conveniently send and receive money for various purposes in both formal and informal transactional contexts. However, the formal use of mobile money for payments, savings,

investments and microinsurance services is quite low because most consumers do not understand the basic processes involved. Additionally, consumers have very little confidence in the efficiency and security of the system due to the frequent network failures and increasing rate of fraud. Overall, there is a general preference for routine cash-based transactions.

Discussion of Emerging Themes

Convenience and flexibility for the consumer were key recurring themes in all the provider perspectives as well as the consumers themselves. Convenience was identified as a need of the unbanked by bank representatives, as well as in the MNO and MFI interviews. Providing it was viewed as a key strategy for promoting financial inclusion. Providers observed that consumers were users of multiple financial services such as banks, SLCs/MFIs, informal savings groups, and mobile money services but have an overshadowing preference for routine cash-based transactions. This was corroborated in the consumer focus groups. This finding is consistent with previous research on mobile money adoption in Ghana where consumers were shown to have a strong preference for cash transactions with limited use of mobile money services outside of remittance (Dzokoto & Appiah, 2014; Tobin & Kuwornu, 2011).

Additionally, network capacity was also recognized as an important recurring theme across the service providers and consumer perspectives. While the issue may have been emphasized differently between the service providers, agents, and consumers, it remains the primary challenge for the development of the mobile money ecosystem. Previous studies have also shown that persistent network and systematic failures can slow the pace of progress of the mobile money ecosystem and present structural barriers to the use of the service (Stefanski et al. 2012; Tobin, 2012). This study confirms that consumers, agents, and MFIs are particularly

concerned about the challenges posed by persistent network failures and the MNOs are making the effort to improve their network capacity.

Consumer education was found to be another important issue that needs to be addressed. The lack of consumer education appears to have created a breeding ground for over-the-counter services and consequently, an increasing rate of fraud. With little to no knowledge of the basic transaction procedures, there is a tendency for slow adaptation, inactive accounts, and compromised pin codes which could also lead to mistrust in the system and eventually, a collapse of the mobile money ecosystem. For instance, previous studies have cited complex procedures and security and privacy concerns as some of the reasons for the low active user rates among low-income consumers (Cudjoe et al., 2015; Koning & Cohen, 2015). A recent pilot audit study of fraud in the mobile money market in Ghana (Annan, 2017), also indicated that approximately 22% of transactions go fraudulent. The rate of fraud was also shown to be higher for large amount transactions and among less sophisticated consumers. The issue of fraud therefore requires immediate attention from service providers and regulators to ensure an efficient and effective mobile money system in Ghana.

Quantitative Results

This section presents the results of descriptive analysis of the sample of 280 respondents of the consumer survey. This is followed by the results of logistic regression analysis to test the likelihood of mobile money adoption, and microfinance service usage behavior. A summary of the hypotheses tested and discussion of the overall results is presented at the end of the section.

Descriptive Statistics

Descriptive statistics are shown in Table 4.6 for the full sample and includes participant demographics, bank account status, saving and borrowing behavior, and uses of MM and MF account services. Some of the variables shown in the descriptive summaries are not included in the regression estimations for the primary purpose of maintaining a parsimonious model.

Socioeconomic and demographic profiles

The survey sample was evenly distributed between males (49%) and females (51%) and about half of the respondents were between the ages of 18 and 34 years (52.5%). For the remaining half, 40% were aged between 34 and 55 years and 8% were 55 years or older. Approximately, 40% had education up to high school or lower, 10% had an associate degree or equivalent, 37% were college graduates and 11% had a master's degree or higher.

The participants were also fairly distributed between the government and private employment sectors with 22% and 21% respectively. Additionally, 36% were self-employed and the remaining 18% were either unemployed or students. Also, 48% were married and 52% were unmarried, with the unmarried group including all single, divorced or separated, and widowed respondents. Household income of the survey respondents ranged from GHC.500 or less to GHC.1000 or more, which is the equivalent of $125 or less to $250 or more, monthly, (based on the 1:4 U.S dollar to Ghana cedi exchange rate in June/July 2017). Specifically, about 23% of the respondents had monthly income lower than $125, 52% had monthly income ranging between $125 and $250, and 20% had monthly income of $250 or higher.

Table 4.6 *Descriptive Statistics (N = 280)*

Variable	Coding	Frequency	Percentage
Gender	Male	137	49.0
	Female	143	51.0
Age group	18-24	55	19.6
	25-34	92	32.8
	35-44	83	29.6
	45-54	25	8.9
	55 or older	23	8.2
Education	High school or less	109	39.0
	Assoc. Degree/equivalent	30	10.7
	College degree	106	37.8
	Master's Degree or higher	33	11.7
	Missing	2	0.8
Employment status	Employee (Gov't/Private sector)	121	43.2
	Self employed	102	36.5
	Unemployed	33	11.7
	Student	22	7.8
	Missing	2	0.8
Marital status	Married	115	41
	Unmarried	163	58.2
	Missing	2	0.8
Household Income	< GHC.500	64	22.9
	GHC. 500 – 749.99	59	21.1
	GHC. 750 – 999.99	87	31.1
	GHC. 1000+	55	19.6
	Missing	15	5.3
Bank account	Yes	248	88.6
	No	32	11.4
Account type	Current(checking)	38	13.6
	Savings	147	52.5
	Both	63	22.1
	Missing (N/A)	32	11.4
New account_(12mths)	Yes	28	10.0
	No	217	77.5
	Missing	35	12.5
Reason for no acct	Banks too far	4	1.5
	Bank too expensive	6	2.1
	No documentation	4	1.5
	Not enough money	14	5.0
	Don't trust banks	2	0.8
	Other	2	0.8
	Missing (N/A)	248	88.6

Table 4.6 Continued

Variable	Coding	Frequency	Percentage
Saved_12mths	Yes	208	74.3
	No	72	25.7
How saved	Bank	146	52.0
	SLC/MFI	18	6.41
	MM acct	19	6.8
	ROSCA	6	2.1
	Susu	13	4.6
	Other	6	2.1
	Missing	72	25.7
Borrwd_12mths	Yes	83	29.2
	No	195	70.0
	Missing	2	0.8
How borrowed	Bank	25	9.0
	SLC/MFI	10	3.6
	ROSCA	6	2.1
	Family/Friend	39	14.0
	Other	5	1.8
	Missing (N/A)	195	70
Proximity	Bank (Branch/ATM)	71	25.4
	Mobile Money agent	205	73.2
	Other	4	1.4
MM account	Yes	240	85
	No	40	15
Primary Use of MM account	Airtime	55	19.6
	Purchases	8	2.8
	Bill Payments	15	5.4
	Send/Receive	152	54.3
	Other	12	4.3
	Missing (N/A)	38	13.6
MM payments	Yes	135	48.0
	No	145	52.0
MM send/receive	Yes	237	85.0
	No	43	15.0
MM save	Yes	114	41.0
	No	166	59.0
MF account	Yes	58	21.0
	No	221	79.0
MF borrow	Yes	12	5.0
	No	266	95.0
MF save	Yes	51	18.2
	No	229	81.8
MF invest	Yes	16	5.7
	No	264	94.3

Use of financial services

As shown in Table 4.6, majority of the respondents had bank accounts (88%) and primarily had savings accounts (52%). About 10% of the respondents had new bank accounts that were opened within the past year. For the 12% with no bank accounts, the primary reasons stated was not having enough money, followed by cost of services, and lack of documentation and proximity. Additionally, 74% had saved in the last twelve months, and almost 70% of the savers had saved with the bank while the rest saved through semi-formal and informal systems including mobile money accounts (9%). Approximately, 29% of the respondents had borrowed money over the past year and 30% of them borrowed from the bank with the majority (47%) borrowing from family and friends. Additionally, 85% of the respondent had mobile money accounts, 84% had sent or received money in the past 60 days, 48% had paid for goods and services, and 40% had saved money for future use, using the mobile money service. Sending and receiving money (remittance) was the most popular primary use of mobile money accounts, followed by airtime top-up and bill payments. Also, 21% of the respondents had microfinance accounts, 5% had borrowed from an MFI, 18% had saved and about 6% had invested with an MFI over the past 60 days. In sum, the survey respondents were predominantly bank account and mobile money account owners, and fewer microfinance account owners. The respondents primarily saved at banks and MFIs, borrowed from family and friends, and used mobile money services for remittance.

Logistic Regression Results

A total of seven logistic models were estimated to test the research hypotheses. Models 1, 2, and 3, examined the key determinants of using mobile money for payments, remittance, and saving, respectively. Model 4 is the multinomial logistic model comparing non-users and

multiple-service users to single-service users of mobile money. Models 5, 6, and 7 explain the key determinants of using microfinance services for borrowing, saving, and investing, respectively. Each regression model uses a total of 20 variables which include 10 external factors, and 10 item variables representing the key constructs of the conceptual model. The 10 item variables were selected to be used as independent indicators from an initial confirmatory factor analysis model of five latent variables with 14 items, after dropping some items due to possible multicollinearity issues. For each service use, I estimate a base model using only the external factors, and a full model with all 20 variables to decompose the strength of association between the external and TAM factors. Models 1, 2, 3, 4 were each fitted to test hypotheses 1, 2, 3, 4, and 9, while model 5, 6, and 7 test hypotheses 5 through 9.

Model 1: Mobile money for payments of goods and services.

The results of model 1 presented in Table 4.7 indicate that having a mobile money account, education level and age are the key external factors that influence the use of mobile money for payments of goods and services. Age is shown to be negatively associated with mobile money use for payments, while education level is shown to have a significant positive association with mobile money use for payments. This indicates that mobile money accounts owners with higher levels of education and who were younger were more likely to use the service for payments of goods and services. The base model with only the external factors explain about 15% of the variability in mobile money use for payments. For the full model, those who were comfortable with using mobile money, and found it to be very useful, were shown to be more likely to use it for payments. However, ease of use and confidence in the mobile money system, were shown to have negative associations with using mobile money for payments.

Table 4.7 *Mobile Money Use for Payment of Goods and Services*

	Base Model				Full Model			
Variable	Coef	SE	P>|z|		Coef	SE	P>|z|	
Bank account	0.358	0.456	0.432		0.297	0.526	0.572	
Proximity	0.078	0.319	0.808		0.048	0.354	0.892	
MM account	2.142	0.522	0.000	***	2.104	0.553	0.000	***
MF account	-0.259	0.352	0.462		-0.161	0.382	0.674	
Gender	-0.401	0.286	0.162		-0.529	0.316	0.094	^
Age	-0.347	0.151	0.022	*	-0.337	0.165	0.040	*
Education	0.391	0.143	0.006	**	0.468	0.163	0.004	**
Employment	0.013	0.194	0.948		-0.166	0.213	0.437	
Marital Status	0.413	0.322	0.201		0.423	0.342	0.215	
Income	-0.002	0.131	0.989		-0.074	0.147	0.615	
Convenience					-0.002	0.224	0.994	
Time saving					-0.346	0.239	0.148	
Usefulness					0.605	0.271	0.025	*
Ease of use					-0.594	0.255	0.020	*
Comfortable with use					0.766	0.249	0.002	**
Security					0.285	0.181	0.115	
Privacy					0.209	0.169	0.217	
Confidence					-0.843	0.244	0.001	**
Less expensive					0.107	0.139	0.442	
Only option					0.052	0.143	0.715	
Constant	*-1.971*	*1.180*	*0.095*		*-2.071*	*1.519*	*0.173*	
Pseudo R2	**0.1477**				**0.2213**			

*Note: ^ p<0.1 * p<0.05. ** p<0.01. *** p<0.001*

Additionally, gender becomes barely significant (p-value < 0.1) with a negative association, which indicates that males were less likely to use mobile money for payment.

Model 1 generally indicates that respondents who use mobile money for payments were more likely to be younger and more educated female account holders, who were comfortable with using it and found it to be very useful. However, those who did not consider mobile money to be easy to use and had low confidence in the system were less likely to use the service for payments. The full model explains 22% of the variability in the likelihood of using mobile

money for payments of good and services. The model provides support for hypotheses 1, 2, 3 and 4, which shows that external variables as well as perceived usefulness, perceived ease of use, and security and privacy concerns (confidence), are associated with mobile money usage behavior.

Model 2: Mobile money for sending and receiving (remittance)

Table 4.8 presents the results of Model 2 which examine the indicators of mobile money use for sending and receiving money. The results of the base model indicate that apart from having a mobile money account, proximity to a mobile money agent and education level are positively associated with using mobile money for remittances. Household income is however shown to be negatively associated with using mobile money for remittances which indicates that low income individuals were more likely to use this service. The external factors explain about 27% of the variability in the likelihood of using mobile money for remittances with weak associations (p-values < 0.1) for proximity, education, and income. In addition, convenience, time saving, and ease of use were also shown to be significantly associated with the likelihood of using mobile money for remittance in the full model. Similar to its negative association with mobile money use for payments (Model 1), ease of use is shown to be negatively associated with mobile money for remittance. Education also gains a stronger association (p-value <0.05) in the full model, compared to the strength of its association in the base model. The full model indicates that mobile money account holders who are female, educated and with lower incomes were more likely to use the service for remittances. The positive associations with convenience and time-saving imply that these factors increase the likelihood of using the service, while ease of use decreases the likelihood of using the service, given its negative association.

Table 4.8 *Mobile Money for Remittance*

	Base Model				Full Model			
Variable	Coef	SE	P>|z|		Coef	SE	P>|z|	
Bank account	0.911	0.581	0.117		0.774	0.659	0.241	
Proximity	0.908	0.503	0.071	^	0.578	0.568	0.309	
MM account	3.006	0.456	0.000	***	2.798	0.536	0.000	***
MF account	-0.467	0.506	0.356		-0.517	0.589	0.380	
Gender	-0.728	0.473	0.124		-0.871	0.511	0.088	^
Age	0.245	0.216	0.255		0.191	0.249	0.443	
Education	0.376	0.226	0.097	^	0.514	0.261	0.049	*
Employment	0.099	0.316	0.754		-0.120	0.344	0.728	
Marital Status	0.040	0.485	0.935		0.013	0.545	0.981	
Income	-0.384	0.223	0.085	^	-0.475	0.246	0.053	^
Convenience					0.648	0.310	0.036	*
Time saving					0.551	0.312	0.077	^
Usefulness					-0.145	0.399	0.716	
Ease of use					-0.760	0.419	0.069	^
Comfortable with use					0.422	0.378	0.264	
Security					-0.350	0.279	0.209	
Privacy					0.345	0.269	0.200	
Confidence					-0.019	0.362	0.957	
Less expensive					0.035	0.241	0.883	
Only option					0.196	0.242	0.419	
Constant	*-1.781*	*1.769*	*0.314*		*-3.152*	*2.272*	*0.165*	
Pseudo R2	**0.2679**				**0.3521**			

*Note: ^ p<0.1 * p<0.05. ** p<0.01. *** p<0.001*

The full model explains 35% of the variability in the likelihood of using mobile money for remittance services based on the external and TAM factors. The model provides supports for hypotheses 1, 2, and 3, which shows that external variables, perceived usefulness and perceived ease of use are significantly associated with mobile money usage behavior.

Model 3: Mobile money for saving

The results of Model 3, which examines the indicators of using mobile money for saving are presented in Table 4.9. The results of the base model indicate that in addition to having a mobile money account, education and income are the key external factors that significantly influence the likelihood of using mobile money for saving. While education is shown to be positively associated with mobile money use for saving, income is negatively associated with this use. The base model explains approximately 14% of the variability in the likelihood of using mobile money for saving based on the external factors. The full model also indicates that privacy concerns and mobile money as the only option for financial services are the key factors that influence the likelihood of using this service in addition to the external variables. While the association with education is strengthened in the full model, income loses its significance and age gains a weak negative association with this use. The negative association with privacy concerns is an indication that those who worry about privacy issues are less likely to use mobile money for saving. It is also important to note that, though not significant, the negative association with the bank account variable could be an indication that this service users typically do not have bank accounts. The full model generally shows that mobile money account holders, who are younger, more educated, and have mobile money as their only option for financial services are more likely to use the service for saving. This model explains 21% of the variability in the likelihood of using mobile money for saving and support hypotheses 1 and 4 which show that external factors, and security and privacy concerns are significantly associated with using mobile money for saving. The significance of only option is also an indication of a possible mediating effect of perceived control.

Table 4.9 *Mobile Money for Saving*

	Base				Full			
Variable	Coef	SE	P>|z|		Coef	SE	P>|z|	
Bank account	-0.706	0.458	0.123		-0.441	0.507	0.384	
Proximity	0.291	0.321	0.364		0.373	0.352	0.289	
MM account	2.967	0.754	0.000	***	2.894	0.790	0.000	***
MF account	0.001	0.351	0.997		0.287	0.382	0.452	
Gender	-0.250	0.289	0.388		-0.048	0.318	0.880	
Age	-0.148	0.148	0.317		-0.299	0.169	0.077	^
Education	0.342	0.149	0.021	*	0.510	0.168	0.002	**
Employment	-0.116	0.196	0.554		-0.168	0.210	0.423	
Marital Status	-0.450	0.319	0.158		-0.535	0.343	0.119	
Income	-0.244	0.133	0.067	^	-0.177	0.146	0.225	
Convenience					-0.007	0.227	0.977	
Time saving					-0.185	0.231	0.425	
Usefulness					0.320	0.270	0.236	
Ease of use					0.192	0.251	0.444	
Comfortable with use					0.021	0.227	0.925	
Security					0.140	0.176	0.426	
Privacy					-0.390	0.173	0.024	*
Confidence					0.273	0.216	0.206	
Less expensive					0.198	0.135	0.145	
Only option					0.370	0.142	0.009	**
Constant	*-1.772*	*1.310*	*0.176*		*-5.895*	*1.709*	*0.001*	
Pseudo R2	**0.1374**				**0.2114**			

*Note: ^ p<0.1 * p<0.05. ** p<0.01. *** p<0.001*

Model 4: Non-use, single-service and multiple-service users of mobile money.

Table 4.10 presents the results of the multinomial logistic model (Model 4) that compares non-users and multiple-service users to the most prolific group of single-service users of mobile money. The results indicate that compared to those who typically use mobile money for only one of the three services, non-users of mobile money did not have mobile money accounts, had higher incomes and did not consider the service to be time saving. The mobile money account, education, marital status, and security variables were also shown to be positively associated with

using two of the services. This result shows that mobile money account owners who were more educated, married, and considered the system to be secured were more likely to use two services as compared to the single-service users. Finally, account owners who were younger, more educated, and considered mobile money to very useful as well as their only option for financial services were more likely to use all three services compared to the single-service users. However, the time saving variable was shown to be negatively associated with this multiple-use group, similar to its negative association with the non-users group. The model explains approximately 24% of the variability in mobile money service usage behavior. The model also supports hypotheses 1, 2, and 4, showing that external factors, perceived usefulness, security and privacy concerns with perceived control as a possible mediator are associated with mobile money usage behavior.

Model 5: Microfinance for borrowing

The results of Model 5 summarized in Table 4.11 indicate that apart from having a microfinance account, external factors do not have any significant associations with using microfinance for borrowing. The base model explains approximately 9% of the variability in the likelihood of using this service. However, the microfinance account variable loses its significance in the full model, and only comfortable with use and privacy are shown to be significantly associated with using this microfinance service. The negative association with the privacy variable indicates that microfinance account holders who have concerns about privacy issues are less likely to use the service for borrowing

Table 4.10 *Non-use, Single-use and Multiple uses of Mobile Money*

	Non-users				Two-service users				Three-service users			
Variable	Coef	S E	P>z		Coef	S E	P>z		Coef	S E	P>z	
Bank account	-0.182	0.744	0.807		0.296	0.592	0.617		0.644	0.686	0.348	
Proximity	-0.105	0.694	0.879		-0.208	0.428	0.627		0.438	0.500	0.381	
MM account	-1.925	0.611	0.002	**	3.323	1.093	0.002	**	2.484	0.875	0.005	**
MF account	0.290	0.658	0.659		-0.388	0.448	0.386		0.243	0.504	0.630	
Gender	0.797	0.592	0.179		0.093	0.389	0.811		-0.304	0.428	0.477	
Age	-0.266	0.272	0.328		-0.152	0.186	0.414		-0.549	0.230	0.017	*
Education	-0.376	0.303	0.215		0.487	0.204	0.017	*	0.726	0.228	0.001	**
Employment	0.104	0.412	0.800		-0.090	0.260	0.729		-0.414	0.285	0.147	
Marital Status	0.384	0.618	0.535		0.794	0.404	0.049	*	-0.075	0.474	0.874	
Income	0.597	0.286	0.037	*	-0.055	0.174	0.753		-0.092	0.197	0.640	
Convenience	-0.580	0.401	0.148		0.090	0.296	0.760		-0.222	0.319	0.486	
Time saving	-0.779	0.409	0.057	^	-0.154	0.303	0.611		-0.663	0.330	0.045	*
Usefulness	0.521	0.466	0.264		0.310	0.312	0.321		0.973	0.372	0.009	**
Ease of use	0.687	0.449	0.126		-0.105	0.276	0.705		-0.168	0.348	0.629	
Comfortable with use	-0.545	0.426	0.200		0.121	0.263	0.646		0.511	0.320	0.110	
Security	0.545	0.332	0.101		0.380	0.218	0.081	^	0.303	0.247	0.220	
Privacy	-0.363	0.317	0.253		-0.062	0.203	0.759		-0.230	0.235	0.329	
Confidence	-0.378	0.431	0.381		-0.380	0.277	0.171		-0.470	0.315	0.135	
Less expensive	-0.158	0.282	0.576		0.116	0.160	0.467		0.180	0.189	0.339	
Only option	-0.016	0.295	0.957		0.076	0.177	0.665		0.482	0.196	0.014	*
Constant	*2.063*	*2.563*	*0.421*		*-4.799*	*2.084*	*0.021*		*-4.699*	*2.196*	*0.032*	
Pseudo R2	**0.2393**											

*Note: ^ p<0.1 * p<0.05. ** p<0.01. *** p<0.001 (Base group = single-service users)*

Table 4.11 *Microfinance for Borrowing*

	Base				Full			
Variable	Coef	SE	P>|z|		Coef	SE	P>|z|	
Bank account	0.058	0.853	0.946		0.238	0.938	0.800	
Proximity	-0.522	0.688	0.448		-0.770	0.781	0.324	
MM account	-0.132	0.741	0.859		0.154	0.867	0.859	
MF account	1.121	0.613	0.067	^	0.626	0.839	0.455	
Gender	0.480	0.699	0.492		0.777	0.778	0.318	
Age	0.291	0.274	0.289		0.353	0.308	0.251	
Education	-0.150	0.335	0.655		-0.011	0.399	0.977	
Employment	0.172	0.469	0.714		0.143	0.515	0.781	
Marital Status	-0.027	0.641	0.967		0.174	0.719	0.809	
Income	0.012	0.292	0.966		-0.024	0.326	0.941	
Convenience					-0.123	0.478	0.797	
Time saving					0.191	0.473	0.687	
Usefulness					0.956	0.709	0.177	
Ease of use					-0.109	0.630	0.862	
Comfortable with use					0.895	0.540	0.097	^
Security					-0.179	0.508	0.724	
Privacy					-1.094	0.610	0.073	^
Confidence					-0.489	0.583	0.401	
Less expensive					0.422	0.610	0.489	
Only option					0.213	0.394	0.589	
Constant	*-3.988*	*2.538*	*0.116*		*-7.057*	*3.556*	*0.047*	
Pseudo R2	**0.0899**				**0.1937**			

*Note: ^ p<0.1 * p<0.05. ** p<0.01. *** p<0.001*

The full model explains 19% of the variability in the likelihood of using microfinance services for borrowing and supports hypotheses 7 and 8, by showing that perceived ease of use and security and privacy concerns are associated with microfinance service usage behavior.

Model 6: Microfinance for saving

The results of Model 6 presented in Table 4.12 indicate that apart from having a microfinance account, education level is the only external factor that influences the probability of saving with an MFI.

Table 4.12 *Microfinance for Saving*

	Base				Full			
Variable	Coef	SE	P>|z|		Coef	SE	P>|z|	
Bank account	0.697	0.770	0.365		0.977	0.929	0.293	
Proximity	0.306	0.721	0.672		0.272	0.900	0.762	
MM account	1.337	0.877	0.128		2.129	1.156	0.066	^
MF account	4.735	0.600	0.000	***	4.865	0.802	0.000	***
Gender	0.457	0.594	0.442		0.849	0.712	0.233	
Age	0.373	0.259	0.149		0.446	0.283	0.115	
Education	-0.739	0.312	0.018	*	-0.937	0.395	0.018	*
Employment	-0.104	0.429	0.808		-0.259	0.509	0.611	
Marital Status	0.079	0.596	0.894		-0.159	0.672	0.813	
Income	-0.340	0.243	0.162		-0.460	0.293	0.117	
Convenience					0.263	0.569	0.644	
Time saving					-0.347	0.434	0.424	
Usefulness					0.769	0.719	0.285	
Ease of use					-1.173	0.798	0.141	
Comfortable with use					1.382	0.515	0.007	**
Security					-0.155	0.542	0.775	
Privacy					-0.407	0.701	0.561	
Confidence					-0.544	0.550	0.323	
Less expensive					0.543	0.499	0.277	
Only option					-0.137	0.387	0.724	
Constant	*-4.932*	*2.297*	*0.032*		*-6.583*	*3.249*	*0.043*	
Pseudo R2	**0.6030**				**0.6615**			

*Note: ^ p<0.1 * p<0.05. ** p<0.01. *** p<0.001*

The negative association with education indicates that microfinance account owners with lower levels of education are more likely to use the service for saving. The base model explains 60% of the variability in the likelihood of saving with an MFI based on external factors. In addition to having a microfinance account and education level, having a mobile money account and being comfortable with using microfinance services were also shown to be significant in the full model. The model generally indicates that microfinance account owners, who also owned mobile money accounts, and were less educated and comfortable with using microfinance services were more likely to save with an MFI. The full model explains 66% of the variability in the likelihood

of saving with an MFI and provides support for hypotheses 5, 7, and 9. The model shows that external variables and perceived ease of use are significantly associated with microfinance service usage behavior and also that microfinance and mobile money usage are associated.

Model 7: Microfinance for investing

The results of the final model presented in Table 4.13 summarize the relationships between external factors and the TAM variables, and using microfinance service for investing. The base model indicates that apart from having a microfinance account, age is the only external factor that is significantly associated with investing with an MFI. The negative association with age shows that younger microfinance account owners were more likely to use microfinance services for investment. The base model explains approximately 32% of the variability in the likelihood of investing with an MFI based on external factors. For the full model, ease of use, comfortable with use, and security concerns were the key indicators of investing with an MFI, in addition to having a microfinance account.

While age loses its significance in the full model, the negative association with security indicates that account holders with who have security concerns are less likely to invest with an MFI. The model indicates that microfinance account owners who find the service easy to use and are comfortable with using the service are more likely to use the service for investment. This model explains 46% of the variability in the likelihood of using microfinance service for investing and supports hypotheses 7 and 8. The model shows that perceived ease of use and security and privacy concerns are associated with microfinance usage behavior.

Table 4.13 *Microfinance for Investing*

	Base				Full			
Variable	Coef	SE	P>|z|		Coef	SE	P>|z|	
Bank account	0.482	1.135	0.671		0.184	1.444	0.899	
Proximity	0.298	0.823	0.717		0.068	1.040	0.948	
MM account	-0.419	0.899	0.641		-0.671	1.081	0.535	
MF account	3.636	0.765	0.000	***	4.582	1.237	0.000	***
Gender	0.178	0.671	0.790		0.227	0.809	0.779	
Age	-0.778	0.386	0.044	*	-0.549	0.445	0.218	
Education	0.115	0.320	0.720		0.151	0.423	0.721	
Employment	0.447	0.448	0.319		0.665	0.556	0.232	
Marital Status	0.412	0.736	0.576		-0.840	0.954	0.379	
Income	0.519	0.320	0.105		0.541	0.407	0.184	
Convenient					-0.783	0.486	0.107	
Time saving					-0.008	0.440	0.985	
Usefulness					-0.594	0.579	0.305	
Ease of use					1.188	0.658	0.071	*
Comfortable with use					1.133	0.516	0.028	*
Security					-0.928	0.514	0.071	*
Privacy					0.594	0.631	0.346	
Confidence					-0.663	0.600	0.269	
Less expensive					-0.090	0.649	0.890	
Only option					-0.466	0.471	0.323	
Constant	*-6.675*	*2.856*	*0.019*		*-6.053*	*3.858*	*0.117*	
Pseudo R2	**0.3165**				**0.4622**			

*Note: ^ p<0.1 * p<0.05. ** p<0.01. *** p<0.001*

Mediation analysis

The hypothesized mediated relationships were tested separately following the four-step mediation process (Barron & Kenny, 1986). The results of the first three steps of the process are presented in Table 4.14. The results of the final step are parallel to the results of the full models for each service presented earlier and are therefore not shown. In the first step, I fitted regression models to predict each mobile money and microfinance usage behavior using the eight independent variables (excluding the two mediating variables) to establish significance between

the predictors and response variables. I found significant patterns similar to the relationships established in the full models discussed earlier and therefore proceeded to the next step. In the second step, I fitted regression models using the eight independent variables and the mediation variables as response variables separately, for mobile money and microfinance services. I found significant relationships between usefulness and confidence with the consumer attitude variable (less expensive), and between privacy and the perceived control variable (only option) for mobile money usage. I also found significant relationships between comfortable with use, and privacy with consumer attitude, and between time-saving, comfortable with use, and confidence with perceived control for microfinance usage. In the third step, I fitted regression models with the mediating variables as the only independent variables for each of the mobile money and microfinance response variables. I found significant relationships between perceived control and mobile money for saving, consumer attitude and microfinance for saving, aa well as between consumer attitude and perceived control, and microfinance for investing. For the final step, I used the previously fitted full models to confirm the likelihood of any mediating effects of consumer attitude and/or perceived control and the independent variables.

The independent variables that were significant in Step 1 mostly remained significant in the final steps but the mediating variables were insignificant except for PC in the mobile money for saving model. The significance of privacy and only option in Model 3 indicates a partial mediating effect of perceived control on security and privacy concerns in relation to using mobile money for saving. Table 4.15 summarizes the results of the study in relation to which hypotheses were supported or not supported.

Table 4.14 Mediation Analysis

Step 1							**Step 2**			
	MM			MF			MM		MF	
	Model 1	Model 2	Model 3	Model 5	Model 6	Model 7	CA	PC	CA	PC
	P>z	P>z	P>z	P>z	P>z	P>z	P>z	P>z	P>z	P>z
Convenience	0.752	0.002	0.478	0.843	0.066	0.269	0.614	0.752	0.483	0.082
Time-saving	0.025	0.259	0.516	0.456	0.044	0.790	0.497	0.324	0.535	0.000
Usefulness	0.024	0.863	0.292	0.015	0.008	0.843	0.049	0.971	0.978	0.591
Ease of use	0.242	0.242	0.171	0.734	0.009	0.376	0.101	0.326	0.150	0.380
Comfortable	0.000	0.031	0.822	0.147	0.015	0.126	0.513	0.420	0.047	0.048
Security	0.056	0.371	0.155	0.905	0.607	0.465	0.791	0.776	0.637	0.199
Privacy	0.651	0.345	0.032	0.071	0.379	0.114	0.169	0.000	0.003	0.828
Confidence	0.001	0.920	0.380	0.325	0.389	0.049	0.037	0.545	0.661	0.020
Constant	*0.088*	*0.068*	*0.001*	*0.000*	*0.000*	*0.001*	*0.008*	*0.001*	*0.000*	*0.757*

Step 3

	MM			MF		
	Model 1	Model 2	Model 3	Model 5	Model 6	Model 7
	P>z	P>z	P>z	P>z	P>z	P>z
CA	0.317	0.107	0.152	0.476	0.000	0.000
PC	0.100	0.753	0.020	0.540	0.162	0.000
Constant	*0.998*	*0.003*	*0.000*	*0.000*	*0.000*	*0.006*

Table 4.15 Summary of Hypothesized Results

Hypothesis	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
H1 (EF)	Supported	Supported	Supported	Supported	Not tested	Not tested	Not tested
H2 (PU)	Supported w/ no mediation	Supported w/ no mediation	Not supported	Supported	Not tested	Not tested	Not tested
H3 (PEU)	Supported w/ no mediation (-)	Supported w/ no mediation (-)	Not supported	Not supported	Not tested	Not tested	Not tested
H4 (SEC)	Supported (-)	Not supported	Supported with partial mediation (-)	Supported (-)	Not tested	Not tested	Not tested
H5 (EF)	Not tested	Not tested	Not tested	Not tested	Not supported	Supported	Supported
H6 (PU)	Not tested	Not tested	Not tested	Not tested	Not supported	Not supported	Not supported
H7 (PEU)	Not tested	Not tested	Not tested	Not tested	Supported w/ no mediation	Supported w/ no mediation	Supported w/ no mediation
H8 (SEC)	Not tested	Not tested	Not tested	Not tested	Supported w/ no mediation (-)	Supported w/ no mediation (-)	Not supported
H9 (MM <–> MF)	Not supported	Not supported	Not supported	Not supported	Not supported	Supported	Not supported

Discussion

In summary, the descriptive statistics indicate that the survey respondents primarily saved at banks and MFIs, borrowed from family and friends, and used mobile money services for remittances. This finding is consistent with the results from the focus group discussions where consumers were also shown to be users of multiple financial services. The logistic regression analyses also indicate that external factors, perceived usefulness, perceived ease of use, security and privacy concerns, and perceived control affect the use of mobile money and microfinance services differently.

Factors affecting mobile money adoption

The regression results show that mobile money adoption is influenced by external factors such as proximity and socioeconomic variables as well as the consumers' perception of the usefulness, ease of use, and security of the system. First, for the external factors, bank account status was not shown to be significantly associated with any of the mobile money service uses, and proximity was only shown to be significantly associated with using mobile money for remittance. Age was shown to be negatively associated with using mobile money for payments and saving, while education level was positively associated with all-three mobile money uses. Household income was also shown to be negatively associated with mobile money use for remittance and saving. This finding shows that education generally increases the likelihood of using mobile money services with the payments and saving options attracting younger account holders, and remittance and savings attracting lower income consumers. This finding is partly consistent with previous studies on mobile money adoption in Ghana where the service was shown to be targeting more educated and higher income households (Dzokoto & Appiah, 2014).

Secondly, convenience, time saving, and usefulness which are components of the perceived usefulness factor were also shown to be associated with the use of mobile money services. Convenience and time saving were shown to have significant and positive associations with the use of mobile money for remittance, while usefulness was positively associated with using mobile money for payments. Remittance is the most prolific use of the mobile money service and therefore the appeal of convenience is consistent with the findings from the qualitative analysis. Kusimba et al., (2013) also found that individuals, family networks, as well as rotating savings and credit associations (ROSCAs) also used mobile money more frequently for convenience. This finding is also consistent with previous findings where perceived usefulness was shown to be positively associated with adoption of mobile banking products (Jahangir & Begum, 2008; Tobin 2012).

Thirdly, perceived ease of use was shown to be negatively associated with the use of mobile money for payments and remittance, but not related to using the service for saving. The negative association of ease of use with mobile money usage is comparable to the findings from the qualitative analysis where consumers expressed a lack of understanding of the basic transactional processes. Previous studies have also indicated that non-intuitive and complex procedures are some of the reasons for low active-user rates of mobile money accounts (Frimpong & Gyamfi, 2016; Koning & Cohen, 2015).

Additionally, security and privacy concerns was shown to be negatively associated with the usage of mobile money services. Specifically, privacy concerns and confidence in the system were negatively associated with using mobile money for saving, and payments, respectively. This implies that consumers who worry about privacy issues and lacked confidence in the mobile money system were less likely to use the service, and specifically for payments and saving. The

issue of security concerns and particularly in relation to fraud was also an important recurring theme in the service providers and focus group interviews and cannot be overlooked. This finding is also consistent with previous studies that showed that security and privacy concerns were major barriers to the use of mobile banking and mobile money services (Cudjoe et al., 2014; Dias & McKee, 2010; Hanouch & Rotman, 2013; Jahangir & Begum, 2008; Stefanskin et al., 2012).

Finally, the perceived control variable (only option) was shown to be significantly and positively associated with mobile money for saving. Moreover, the bank account status though not significant in the model was negatively associated with using mobile money for saving and confirms the role of mobile money as an alternative to traditional banking. This finding is consistent with previous research where mobile money was shown to be the only connection to the financial system for about 6% of adults in SSA (Demirguc-Kunt et al., 2014). It is also an important indication of the impact of mobile money as a key driver of financial inclusion in Ghana.

Factors affecting adoption of microfinance services

The adoption of microfinance services was also shown to be influenced by external factors and consumer perceptions. While bank account status and proximity were not shown to be significantly associated with microfinance service usage, age and education were negatively associated with using microfinance for investing, and saving, respectively. Household income however, was not shown to be significantly associated with microfinance service usage. Previous studies on the impact of the microfinance sector have consistently shown that the service typically serves less educated and lower-income households (Allan et al., 2013; Collins et al.,

2009; Dzisi & Obeng, 2013). This study however, showed no evidence of the service targeting lower-income earners, but is consistent with the prevalence among less educated consumers. The strong association between education level and microfinance service usage was supported in both the qualitative and quantitative results of the study.

Additionally, perceived ease of use was positively related to using microfinance for investment, while perceived usefulness was not shown to be significantly related to microfinance service usage. The findings from the focus group discussion supports the positive association with ease of use but clearly contradicts the negative association with usefulness, given the importance of the appeal of convenience of saving with MFIs. Also, security and privacy concerns was shown to be negatively associated with the use of microfinance services. Specifically, security and privacy were negatively associated with using microfinance for saving, and borrowing, respectively. Security and privacy concerns in relation to microfinance service usage was not emphasized in the service provider and focus group discussions. However, its significance in the regression analysis has important implications for policy and future research.

Integration of mobile money and microfinance services

Formal integrations of mobile money and microfinance services were shown to be commonly available among the upper tier bank-like MFIs. These integrations enabled consumers to link their microfinance accounts to their mobile money accounts to facilitate convenient deposits and loan repayments. However, while service providers indicate challenges with network, security, and slow consumer adaptation as major drawbacks, consumers indicate a general lack of awareness and understanding of the basic processes. Despite these challenges, informal integrations between mobile money and microfinance services were found to be more widespread among informal savings groups and associations. For instance, most of the focus

group participants indicated that they routinely used mobile money transfer services for their weekly savings contributions. This finding is consistent with a previous study where mobile money was shown to have penetrated informal saving groups and associations (Kusimba et al., 2013). Additionally, the significant association between having a mobile money account and using microfinance services for saving could be explained as an indication of a possible integration of the services. However, it is not clear whether the MFIs are providing mobile money integrated services, or whether those microfinance service users also happen to mobile money service uses. The indicated integration could therefore be either customer or institutional driven or both and more research is needed to confirm extent and direction of integration.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

This study examined the use and impact of mobile money and microfinance services simultaneously, to determine the factors that influence their use, and to identify their separate and complementary impact on financial inclusion in Ghana. Qualitative and quantitative data collected through interviews and a consumer survey were analyzed to answer the specific research questions. This section presents a discussion of the conclusions, followed by the limitations of the study, and the implications for policy, practice, and future research.

Conclusions

The research questions addressed in this study are, (1) what are the environmental obstacles/challenges to growth and sustainability of mobile money and microfinance services in Ghana; (2) are mobile money services and MFIs advancing the overall goal of financial inclusion separately or integrally in Ghana; and (3) what role do socioeconomic variables, consumer perceptions and attitudes play in the adoption and use of mobile money and microfinance services. The first two research questions are primarily addressed by analyzing the emerging themes from the qualitative interviews which were grounded in the ecosystem model. The third research question is addressed by testing the hypothesized relationships drawn from the conceptual model and review of existing literature.

First, this study found that regulation, network and system failures, fraud and security concerns, and consumer behavior were the major environmental challenges to the growth and sustainability of mobile money and microfinance. While regulatory challenges were the primary

concerns from the provider perspective, network capacity and the consumers' lack of awareness and understanding of the system were recognized as major challenges by both service providers and consumers. Microfinance providers, for instance, indicate network and systematic failures as the primary obstacle for successful integrations with mobile money services. While agents and consumers indicate network issues as a primary reason for lack of confidence in the mobile money system. However, security concerns and the increased risk of fraud were the most recurring challenges to the growth of the mobile money and microfinance systems. Issues such as compromised pins, authorized withdrawals, overcharged transactions, scams, and theft are a few of the specific cases discussed across the MFI, agents and focus group interviews.

Secondly, the study showed that mobile money and microfinance services are both advancing the overall goal of financial inclusion, but more separately than integrally. The findings showed that microfinance products are more of additive financial services that are well-tailored for the less educated, as the consumers were shown to be convenient users of multiple services. Mobile money on the other hand showed evidence of being both additive and transformational. The finding that users with mobile money as the only option for financial services were more likely to use the service for saving is an important indication of its transformative use and role as an important driver of financial inclusion. Its additive use is also confirmed with the association with education and income and no significant link with bank account status. Additionally, the results showed evidence of an association between mobile money and microfinance service uses which is also an indication of a possible integration. Generally, both services are important alternatives to traditional financial services and mobile money is ahead with transformational services.

Thirdly, this study found that socioeconomic factors such as age, education, and income to a much lower extent, play very important roles in the adoption of mobile money and microfinance services. While mobile money for payments and saving, typically attract younger individuals, remittance services (transfers) attract lower income households, and all three services generally attract more educated individuals. Microfinance services on the other hand, generally attract younger and less educated individuals. Additionally, consumer perceptions about usefulness, ease of use, and security of the systems are important indicators of usage behavior. The findings generally showed that mobile money is very useful but not necessarily easy to use, microfinance is very easy to use but not necessarily useful, and both systems are not secured.

The overall conclusion of the study is that mobile money and microfinance are both important alternative financial services and facilitating financial inclusion. Mobile money usage is mainly driven by its usefulness with the remittance service appealing to lower income individuals, and the payments and saving use options to younger and more educated individuals. Microfinance service usage is also driven by its ease of use and appeals to less educated individuals. However, there are eminent challenges relating to regulation, network and system failures, as well as security and fraud that needs to be addressed.

Limitations of the study

This study used primary data collected through multiple methods and therefore has several limitations. The first limitation is that interview data was primarily collected in-person by the researcher and the responses of the participants may have been influenced by unrecognized researcher bias. The effects of qualitative research bias were largely controlled for by using uniform protocol and interview scripts and by remaining neutral in tone, dress, comments, and

body language. However, it is inevitable to control for all the effects of the interviewer's age, gender, social status, and style of language, etc., on the interviewees' responses.

Secondly, the sample may not be entirely representative of the overall population of interest due to certain data collection limitations. Data for the analysis was only collected in the capital city of Accra and although different locations were selected to represent the diverse income, education, employment and social groups, there are limitations on the generalizability of the results. An equal probability of selection approach was used for the quantitative sample where participants were randomly approached and requested to participate in no specific order. However, the sample was entirely urban and the results can only be generalized to the urban population. The specific findings may therefore not necessarily hold for rural mobile money and microfinance users since there may be some location specific challenges that were not considered in this study. Besides, participation in both the qualitative interviews and consumer survey was entirely voluntary and there is always the possibility of self-selection bias effects on the final outcomes of the study particularly on the qualitative outcomes.

Thirdly, the survey instrument was developed from a combination of items that were modified from sections of existing instruments and new items that were developed by the researcher based on previous research. Thus, there was the limitation of establishing internal and external validity and reliability prior to data collection. Validity and reliability checks were therefore conducted after data collection which had an impact on the analytical techniques used and the conclusions of the study. Specifically, the items had acceptable interitem correlation scores and factor loadings as well as very high reliability scores, and yet the measurement model had a poor model fit and would not converge. The proposed GSEM technique could therefore not be used and the items were used individually as independent variables and not as latent factors.

Fourthly, logistic regression uses maximum likelihood estimation (MLE) techniques which generally require larger sample sizes than multiple regression. The general recommendation is to have overall sample sizes greater than 400 and at least 10 observations per estimated parameter (Hair et al., 2010, Hosmer & Lemeshow, 2000). This study used an overall sample size of 280 and therefore the analysis may have failed to detect the significance of some equally important but very small effects. Additionally, the data was cross-sectional and the study was designed as observational research. In observational studies, there is always the possibility of lurking variables that are not controlled for and which may be affecting the observed variables. Therefore, the study can only conclude associations between the observed variables, and regardless of how strong the relationships or how obvious the conclusions may seem, we cannot conclude causation based on an observational study.

Finally, the study employed a convergent parallel mixed methods approach where the qualitative and quantitative data were collected at the same time and integrated in the interpretation of the overall results. Therefore, some issues that were identified in the qualitative interviews were not tested in the quantitative analysis, and certain findings from the quantitative analysis could not be explored in detail in the qualitative analysis. For instance, network failures and fraud concerns were key recurring themes in the qualitative interviews but the extent of these issues were not specifically addressed in the quantitative analysis.

Implications and Recommendations

There are important implications for policy and regulation of mobile money services. The policy environment in Ghana's mobile money market appears to be very conducive for effective partnerships, expansions in the available service options, and the growth of a-cash-lite economy. However, there is the need for more supervision from the Bank of Ghana to ensure the adherence

to the established provisions in the e-money issuers guidelines. There is also the need for regulation to minimize the risk of fraud and protect the valuable savings of the poor, by providing some form of deposit insurance for float accounts. This will ensure high value for monetary transactions and stimulate consumer confidence in the system as well as improve usage rates. Regulation of the microfinance sector also needs to be enforced more regularly to resolve the numerous inconsistencies in the sector.

More importantly, mobile money could be the gateway to a new-era of an inclusive financial sector and a cash-lite economy. Unlike microfinance which is shown to be more tailored towards the bottom half of the social and economic ladder, mobile money appears to bring value to consumers across all social and economic spheres. The system has deeply penetrated the economy in both formal and informal contexts due to the high mobile phone penetration. However, there are specific issues that require very careful considerations on the part of the service providers. These issues include consumer education to improve awareness, improving the network capacity and security of the system, and preventing fraud. One of the important findings of the research was the negative associations between ease of use and security, and mobile money services. The implication could be that consumers may not consider the service to be easy to use because they do not understand the basic procedures, and may therefore be more skeptical about using the service. MNOs should be more open to employing different educational/informational projects to increase consumer awareness and understanding of the basic processes. This may involve moving away from one-size fits all commercials to developing more group specific marketing tools based on consumer profiles. Additionally, improvements in the network and capacity of the system to hold higher volumes of transactions will also ensure more efficient integrations, improved partnerships and increased consumer

confidence. Addressing issues related to security and fraud prevention lies mostly on the MNOs and must be treated with all urgency. Security and privacy concerns in relation to microfinance service usage was not emphasized in the provider and focus group interviews. However, its significance in the regression analysis is an important indication of the eminence of the security problem in the financial market in Ghana. Policy and regulation to promote a more secured microfinance system must be developed to promote consumer confidence in sector.

Consumer advocates and community agencies who work with consumer groups particularly in the informal sectors can also serve as channels for creating consumer awareness as well as assisting consumers to address redress issues. These community and social groups can use more hands-on demonstrations and information sessions to promote awareness on how to use the services, and how to identify and prevent fraud. Without well-established consumer protection agencies, consumer education and advocacy efforts should be specifically led by these community and social groups and targeted at promoting awareness and empowerment.

This study has important implications for future research. First, this study extended the existing body of literature by exploring the perspectives of service providers and consumers simultaneously using a convergent parallel mixed methods approach to collect and analyze data. Future research may employ an exploratory or explanatory sequential mixed methods approach, where one phase is conducted first and the second phase is built as a follow-up to confirm the findings from the former. Specifically, issues related to fraud was a recurring theme in the qualitative analysis that needs to be specifically examined and confirmed with quantitative analysis. Future studies on fraud can be designed to investigate the different types of fraud consumers have been exposed to, the channels they followed to seek redress, and the outcomes of the redress process. Future studies can also be designed to investigate the integrations between

mobile money and other financial services such as microfinance, bank products, insurance, and other payment services to confirm the transformative impact of mobile money on financial inclusion. Studies on integrations would be useful in examining the nature, extent, and direction of integration.

Additionally, the model fit values ranged from a low of 0.19 to a high of 0.66 for the microfinance uses and a low of 0.21 to a high of 0.35 for the mobile money uses. This could be an indication of the possible effects of unique explanatory control variables for the separate services or for the specific uses within each service. Future studies may therefore consider exploring additional proxies for external variables based on existing literature for the specific uses or perhaps using different frameworks for each service. Finally, future studies may consider using more representative samples and larger sample sizes, as well as designing randomized experiments, to generate more generalizable results and confirm causal relationships.

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APPENDICES

Appendix A: Bank Interview Script

First, I'd like to ask you some general questions about your institution's services. *(If you have this information in print you can provide me with a copy of the printed material)*

What basic services/products do you offer?

What are the basic (current/saving) account opening requirements (amount, documentation, service charges, other)?

What is the minimum account balance requirement if any?

What types of consumer loans do you offer?

What are the basic requirements for acquiring these loans??

What are the standard interest rates (fixed/variable) and service charges for loan accounts?

What are the basic requirements for opening an investment or longer-term asset account if any?

What are the standard interest rates on investment accounts?

Now I'd like to ask you some questions about your institution's experiences with reaching out to unbanked /underbanked individuals

Does your institution specifically target unbanked or underbanked customers who use alternative financial services besides banks?

What have been the challenges of reaching and keeping these consumers?

What banking service needs or concerns, if any, are you aware of among the underbanked or unbanked prospective customers?

Do you feel your institution has products that address these needs?

Now I'd like to ask some questions about microfinance services/products

Does your institution offer any microfinance products (i.e. specialized small amount deposits and/or loans for individuals)?

If yes, please describe these products?

Do you have any partnerships with any MFIs?

If yes, please describe the products/services offered in partnership with MFIs?

Do you consider MFIs as a threat or opportunity and why?

Now I'd like to ask you some questions about mobile money services?

Do you offer mobile banking and how do consumers get access to your service(s)?

Does your institution offer any mobile money products that specifically target unbanked/underbanked consumers?

What, if any, partnerships do you have with other service providers/operators to offer mobile money?

If yes, please describe the products, and the joint operation and your role in delivering the product or service in this way to consumers.

How effective do you think these product strategies have been in reaching the unbanked or underbanked consumers in your target area.

Do you see mobile money as a threat or opportunity and why?

Now, I'd like to ask you some questions about financial education, outreach, promotion, and consumer protection strategies.

What financial education programs or activities does your institution offer? (Describe what they are, who offers them, and where they offered)

What outreach and promotion programs does your institution offer? (Describe what they are, who offers them, and where they offered)

What consumer redress channels does your institution offer? (Describe what they are, who offers them, and where they offered)

How effective have each of these been in reaching the unbanked and underbanked (in terms of new accounts opened, retained, increased trust, increased information on both sides)?

Are they any other challenges or issues that should be noted?

Appendix B: MNO Interview Script

First, I would like to ask about some general background information and status of your mobile money operation in terms of number of users, agents, market share and available products. **(***If you have this information in a brochure or other written document you can also provide me a copy of the document***)**

What basic services/products do you offer?

Number of registered phone subscribers	
MM program start date	
Number of registered users	
Number of active users	
Number of registered agents	
Number of active agents	
Frequently used products	
Least used products	

What are the training and registration requirements for agents?

What are your basic service charges and the pricing disclosure requirements for agents?

Next, I would like to ask about the key partners of your mobile money operations and their roles in relation to program delivery? By key partners I mean ally banks (account custodians), banks and/or other financial service providers offering products through mobile money platforms, payment companies, etc. *(You can provide this information in print form as well)*

Please name the partner companies and describe the products /programs offered and the specific partner roles.

Partner name	Program/product	Partner roles

Do you offer any microfinance products or services?

If yes, what has your experience in offering these products/services been?

If not offering them, why?

Does your company plan to offer MF products/services in the future?

What is your primary incentive as a telecom operator for offering mobile money services?

Next, I would like to ask you some questions about your success and challenges

What are some of the key factors that have driven the success of your mobile money operations in terms of reaching the unbanked and individuals who use alternative financial services?

What are some of the key factors that have driven the success of your mobile money operation in relation to competition with other MNOs and financial service providers?

What are some of the key factors that have driven the success of your mobile money operation in relation to partnerships with other MNOs and financial service providers?

What are the key challenges in relation to partnership developments?

What are the key challenges in relation to policy and regulation?

What are the key challenges in relation to technology and infrastructure?

What are the key challenges in relation to agent recruitment and management?

What are the key challenges in relation to security and privacy issues?

What are the key challenges in relation to product/service awareness?

What are the key challenges in relation to consumer behavior, and active user rates?

If active user rate is a concern, what efforts or strategies have been employed to improve active user rates?

Now, I'd like to ask you some questions about financial education, outreach, promotion, and consumer protection strategies.

What financial education programs or activities does your institution offer? (Describe what they are, who offers them, and where they offered)

What outreach and promotion programs does your institution offer? (Describe what they are, who offers them, and where they offered)

What consumer redress channels does your institution offer? (Describe what they are, who offers them, and where they offered)

How effective have each of these been in reaching the unbanked and underbanked (in terms of new accounts opened, retained, increased trust, increased information on both sides)?

Are they any other challenges or issues that should be noted?

Appendix C: MFI Interview Script

First, I'd like to ask you some general questions about your institution's services. *(If you have this information in print you can provide me with a copy of the printed material)*

What basic services/products do you offer?

What are the basic requirements for a deposit account or service (amount, documentation, other)?

What are the basic service charges if any for a deposit account?

What are the basic requirements for loan accounts or services?

What are the standard interest rates (fixed/variable) and service charges for loan accounts?

What are the basic requirements for an investment or longer-term asset account if any?

What are the standard interest rates on investment accounts?

What mobile/internet services/products does your institution offer for customers?

Now I'd like to ask you some questions about mobile money services?

Does your institution use mobile money in any as part of your operations with customers?

If yes, please describe how and any partnerships you may have with mobile money operators?

If no, why not?

Are they any plans for partnerships in the future?

Do you consider mobile money as a threat or opportunity and why?

Does your institution offer any innovative or progressive/specialized products that are specifically targeted at reaching new customers?

If yes, please describe the products and the nature of partnership with the mobile money operators?

How effective do you think these product strategies have been in reaching the financially excluded or working poor consumers in your target area.

Next, I would like to ask you some questions about your success and challenges

What are some of the key factors that have driven the success of your microfinance operations in terms of reaching working poor individuals with alternative financial services?

What are some of the key factors that have driven the success of your microfinance operations in relation to competition with other financial service providers?

What are some of the key factors that have driven the success of your microfinance operations in relation to partnerships with other financial service providers?

What are the key challenges in relation to policy and regulation?

What are the key challenges in relation to technology and infrastructure?

What are the key challenges in relation to loan repayment and managing default rates?

What are the key challenges in relation to security and privacy issues?

What are the key challenges in relation to product/service awareness?

What are the key challenges in relation to consumer behavior, and client retention?

Now, I'd like to ask you some questions about financial education, outreach, promotion, and consumer protection strategies.

What financial education programs or activities does your institution offer? (Describe what they are, who offers them, and where they offered)

What outreach and promotion programs does your institution offer? (Describe what they are, who offers them, and where they offered)

What consumer redress channels does your institution offer? (Describe what they are, who offers them, and where they offered)

How effective have each of these been in reaching the unbanked and underbanked (in terms of new accounts opened, retained, increased trust, increased information on both sides)?

Are they any other challenges or issues that should be noted?

Appendix D: Agent Interview Script

First, I'd like to ask you some questions about your services and roles as an agent.

How long have you been in business as a mobile money agent?

What specific services do you provide as an agent?

What is the most frequently used product/service by your customers at this location?

What is the least used product/service at this location?

Which MNO(s) are you an agent for?

What are the training or licensing requirements to start up as a mobile money agent?

Are these the same for all the MNOs?

If not, please explain the specific differences in requirements and how you meet all the requirements?

Now I'd like to ask you some questions about service pricing and profitability.

What are the basic service charges and transaction costs for the services offered?

If the pricing schedule is different for each service provider, please explain the differences and how you manage any issues related to these differences?

How do you disclose service pricing and transaction costs to your customers?

What is the profit margin and or commission rates for the services/products offered?

If the profit/commission rates are different for the MNOs you work with please explain how the differences are reconciled.

Overall, how would you rate the profitability of your business/franchise?

Now I'd like to ask you some questions about your success and challenges as a mobile money agent.

What are the key factors that have driven your success as an agent in relation to marketing and client retention?

What are the key factors that have driven your success as an agent in relation to profitability and sustainability of your business?

What are the key challenges in relation to policy and regulation?

What are the key challenges in relation to technology and infrastructure?

What are the key challenges in relation to your personal safety and security as an agent?

What are the key challenges in relation to security and privacy issues?

What are the key challenges in relation to product/service awareness?

What are the key challenges in relation to consumer behavior, and active user rates?

Are there any other issues or concerns that should be noted?

Appendix E: Focus Group Interview Script

Date:

Location:

Facilitator/Translator:

Note taker:

INTRODUCTION: I would like your permission to ask you some questions about your saving, borrowing, transactional behavior and use of mobile money and microfinance services. The answers to these questions will help to develop a comprehensive analysis of the use and impact of mobile money and microfinance in Ghana. I expect our discussion to last for about an hour and a half, and individual confidentiality will be respected as stated in the signed consent forms.

First, I'd like to ask some general questions about your financial transactions.

How do you usually get paid?

How do you pay your routine household bills?

How do you pay for routine purchases?

How do you send money to family and friends?

In a typical month how often do you use each of the following?

Bank branch deposits/withdrawals, ATM deposits/withdrawal, online banking, check, money order, money transfer through a bank, money transfer through MoneyGram, western union, or other transfer services, mobile money for bill payments, mobile money to send or receive money (domestic/international), mobile money for purchases, mobile money for deposits.

Now, I'd like to ask some background questions about your banking experiences.

Do you have a current or savings account at a bank?

Have you ever had a checking or savings account?

If the account was closed, what were the reasons?

Did you open an account at a bank recently (past 12 months)?

If yes, what was the primary reason for opening this account?

If you do not have a bank account what is the primary reason for this?

Do have any intention of opening an account in next 6 – 12 months?

Now, I'd like to ask some questions about your experiences with other financial companies like savings and loans and microfinance institutions.

Have you ever used the services of a non-bank financial service provider?

[] Savings and loans company

[] Microfinance institution

[] ROSCA/ACSCA

[] SUSU

[] Other_____

Have you ever deposited money (short term savings) at any of these institutions?

Have you ever received a loan from any of these institutions?

Have you ever invested in a longer term-interest earning product at any of these institutions?

Do you currently have an account at any of these institutions?

Which (type of) institution is this?

What has been the most important positive experience from having this account/service?

What has been the greatest challenge or primary concern with using this institution?

Now I'd like to ask some questions about your experiences with mobile money services?

Do you currently use mobile money?

If yes, how long have you used it?

What do you typically use it for?

If no, why not?

What has been your most positive experience with using mobile money?

What has been the greatest challenge or primary concern with using mobile money services?

Do you have any other products or services linked to your mobile money service?

Now I'd like to ask about your saving or borrowing choices?

If you have set any money aside for a future use (saving) in the past 12 months how was this money saved and what is the primary reason for choosing this option?

If you have borrowed money for specific purpose (loan) in the past 12 months how/where was this money borrowed from and what is the primary reason for choosing this option?

Next, I'd like to ask some questions about mobile phone services.

Do you have a mobile phone? What kind of mobile phone do you have i.e. smartphone? Which provider(s) do you use and what is your reason/criteria for choosing the provider. For what kind of services other than making and receiving phone calls do you use with your device? Do you have internet service on your phone? What are your typical monthly mobile phone expenditures?

Finally, I'd like to ask you some questions about your financial knowledge and information.

Where do you get most of your financial knowledge/information from? What topics about financial products, services, and institutions are you interested to know more about? Are you interested in learning more about mobile money? Who would you trust more to obtain financial knowledge? (Bank or financial service provider, parents, peers, schools, media, other?)

Appendix F: Consumer Survey Questionnaire

Please answer the following questions by circling the number next to the answer that applies to you.

1. What is your gender?

   [1] Male [2] Female

2. What is your age range?

   [1] 18 – 24yrs [2] 25 – 34yrs [3] 35 – 44yrs [4] 45 – 54yrs

   [4] 55 – 64yrs [6] 65yrs or older

3. What is the highest level of education you have attained?

   [1] JHS or SHS Diploma [2] Post-Secondary Diploma

   [3] College Degree [4] Master's Degree or higher

4. What is your current employment status?

   [1] Gov't sector employee [2] Private sector employee

   [3] Self-employed (SME) [4] Self-employed (Micro-merchant)

   [5] Unemployed [6] Other (Please specify)
   _____

5. What is your marital status?

   [1] Married [2] Single [3] Divorced [4] Widowed

6. What is your monthly household income?

   [1] [2] [3]

   [4] [5] [6]

7. Do you live or work near the central business district (Accra central)?

   [1] Yes [2] No

8. Do you have a bank account?

   [1] Yes [2] No

9. If yes, what type(s) of account is it? (Please check all that apply)

   [1] Current [2] Savings [3] Other (Please specify) _____

10. If no what is your primary reason for not having a bank account? (Please check only one)

    [1] Banks are too far [2] Banks are too expensive

    [3] I don't have the required documents [4] I don't trust the banks

    [5] I don't have enough money [6] I don't need a bank account

    [7] Other reason (Please specify) _____

11. Do you have an account with an MFI/Savings and loan company (SLC)?

    [1] Yes [2] No

12. Do you have a mobile money account?

    [1] Yes [2] No

13. What primary purpose do you use the mobile money account for? (Please check all that apply

    [1] Air-time purchase [2] Bill payment [3] Purchases

    [4] Send/receive money [5] Salary disbursements [6] Other (Please specify)

    _____

14. Over the past 12 months have you saved or set any money aside for a specific purpose?

    [1] Yes [2] No

15. If yes, how was this money saved?

[1] At the bank [2] At an MFI/SLC [3] With ROSCA/ACSCA

[4] With susu collector [5] At home/family member [6] Other (Please specify) _____

16. Over the past 12 months have you borrowed any money for a specific purpose?

[1] Yes [2] No

17. If yes, how was this money borrowed?

[1] From the bank [2] From an MFI/SLC [3] From ROSCA/ACSCA

[4] From money lender [5] From family member [6] Other (Please specify) _____

18. Over the past 60 days (2 months) have you used mobile money at least once for payment of bills or goods and services?

[1] Yes [2] No

19. Over the past 60 days (2 months) have you used mobile money at least once to receive/send money?

[1] Yes [2] No

20. Over the past 60 days (2 months) have you held money on your mobile money account for future use?

[1] Yes [2] No

21. Over the past 60 days (2 months) have you used a MFI/SLC at least once to borrow money?

[1] Yes [2] No

22. Over the past 60 days have you used a MFI/SLC at least once to save money?

[1] Yes [2] No

23. Over the past 60 days have you used an MFI/SCL to invest in short to medium-term higher interest product?

[1] Yes [2] No

24. Please indicate the extent to which you agree or disagree with the following statements about mobile money by circling a box from 1 – 5 where: 1 = "Strongly disagree"; 2 = "Disagree"; 3 = "Neutral"; 4 = "Agree"; and 5 = "Strongly agree"

Having mobile money makes my life a lot easier	①	②	③	④	⑤
Having mobile money allows me to do a lot of things faster and better	①	②	③	④	⑤
I find mobile money to be very useful in my life	①	②	③	④	⑤
Mobile money is very easy to use	①	②	③	④	⑤
The mobile money system is not complicated	①	②	③	④	⑤
I am very comfortable with using mobile money	①	②	③	④	⑤
Mobile money is a very secured system to use	①	②	③	④	⑤
I never worry about the privacy of my information when using mobile money	①	②	③	④	⑤
I have confidence in the mobile money system	①	②	③	④	⑤

I prefer using mobile money because it is very convenient	①	②	③	④	⑤
I prefer using mobile money because it is less expensive	①	②	③	④	⑤
I prefer using mobile money because it is very fast	①	②	③	④	⑤
Mobile money is my only option for financial services	①	②	③	④	⑤
Mobile money is the most convenient alternative to more expensive financial services	①	②	③	④	⑤

25. Please indicate the extent to which you agree or disagree with the following statements about microfinance by circling a box from 1 – 5 where: 1 = “Strongly disagree”; 2 = “Disagree”; 3 = “Neutral”; 4 = “Agree”; and 5 = “Strongly agree”

Having microfinance makes my life a lot easier	①	②	③	④	⑤
Having microfinance allows me to do a lot of things faster and better	①	②	③	④	⑤
I find microfinance to be very useful in my life	①	②	③	④	⑤
Microfinance is very easy to use	①	②	③	④	⑤
The microfinance system is not complicated	①	②	③	④	⑤
I am very comfortable with using microfinance	①	②	③	④	⑤
Microfinance is a very secured system to use	①	②	③	④	⑤
I never worry about the privacy of my information when using microfinance	①	②	③	④	⑤
I have confidence in the microfinance system	①	②	③	④	⑤

I prefer using microfinance because it is very convenient	①	②	③	④	⑤
I prefer using microfinance it is less expensive	①	②	③	④	⑤
I prefer using microfinance because it is very fast	①	②	③	④	⑤
Microfinance is my only option for financial services	①	②	③	④	⑤
Microfinance is the most convenient alternative to more expensive financial services	①	②	③	④	⑤

Thank you for participating in this survey. Your responses are confidential and will only be reported in aggregates without identifying you or any individual.

Appendix G: Data Codebook

Variable	Description/item	Coding
Bank acc	Do you have a bank account	1 = Yes 0 =No
Proximity	Which of the following is closest (within 10 minutes walking distance) to where you live	0 = bank branch/ATM or other 1 = mobile money agent
MMacc	Do you have a mobile money account?	1 = yes 0 =no
MM1	Over the past 60 days (2 months) have you used mobile money at least once for payment of bills or goods and services?	‘’
MM2	Over the past 60 days (2 months) have you used mobile money at least once to receive/send money	‘’
MM3	Over the past 60 days (2 months) have you deposited money on your mobile money account for future use? (*i.e. saving money for at least three months)*	‘’
MM4	Multiple use of mm services (created by sum of responses for mm1-mm3	0-3 (Multinomial)
YA1 (PU) Convenience	Having mobile money makes my financial life a lot easier	1= strongly disagree 5= strongly agree
YA2 (PU) Time saving	Having mobile money allows me to make financial transactions faster and better	‘’
YA3 (PU) Usefulness	I find mobile money to be very useful in my life	‘’
YA4 (PEU) Ease of use	Mobile money is very easy to use	‘’
YA5 (PEU) Uncomplicated	The mobile money system is not complicated	‘’
YA6 (PEU) Comfortable with use	I am very comfortable with using mobile money	‘’
YA7 (SEC) Security	Mobile money is a very secured system to use	‘’
YA8 (SEC) Privacy	I never worry about the privacy of my information when using mobile money	‘’

YA9 (SEC) Confidence	I have confidence in the mobile money system	‘’
YA10 (CA) Convenience	I prefer using mobile money because it is very convenient	‘’
YA11 (CA) Less expensive	I prefer using mobile money because it is less expensive	‘’
YA12 (CA) Fast	I prefer using mobile money because it is very fast	‘’
YA13 (PC) Only option	Mobile money is my only option for financial services	‘’
YA14 (PC) Convenient alternative	Mobile money is the most convenient alternative to more expensive financial services	‘’
Gender		1= male 0= female
Age		used as continuous
Educ		‘’
Employ		1 = employed /self employed 0 = unemployed or student
Marstat		1 = married 0= unmarried
Income		used as continuous
MFacc	Do you have an account with a microfinance institution	1 = yes 0 = no
MF1	Over the past 60 days (2 months) have you borrow money at least once from a microfinance institution	‘’
MF2	Over the past 60 days have you used a microfinance institution at least once to save money?	‘’
MF3	Over the past 60 days have you used a microfinance institution to invest in a short to medium-term higher interest product? (i.e. money you cannot touch for at least 6months)	‘’
YB1 – YB14	Same items described in YA 1 -14 above but in the microfinance context	

Appendix H: Correlation Tables

	ya1	ya2	ya3	ya4	ya5	ya6	ya7	ya8	ya9	ya10	ya11	ya12	ya13	ya14
ya1	1.000													
ya2	0.652	1.000												
ya3	0.668	0.701	1.000											
ya4	0.537	0.572	0.630	1.000										
ya5	0.292	0.360	0.409	0.657	1.000									
ya6	0.464	0.511	0.608	0.743	0.699	1.000								
ya7	0.379	0.225	0.308	0.339	0.368	0.436	1.000							
ya8	0.287	0.203	0.293	0.331	0.300	0.392	0.575	1.000						
ya9	0.441	0.343	0.460	0.431	0.352	0.533	0.614	0.581	1.000					
ya10	0.599	0.541	0.565	0.511	0.366	0.530	0.320	0.363	0.525	1.000				
ya11	0.309	0.256	0.374	0.343	0.295	0.309	0.257	0.301	0.382	0.342	1.000			
ya12	0.674	0.612	0.643	0.573	0.353	0.529	0.356	0.292	0.447	0.608	0.311	1.000		
ya13	0.136	0.112	0.112	0.068	-0.015	0.093	0.220	0.345	0.234	0.096	0.357	0.037	1.000	
ya14	0.313	0.341	0.377	0.314	0.212	0.333	0.237	0.281	0.364	0.352	0.445	0.371	0.322	1.000

	yb1	yb2	yb3	yb4	yb5	yb6	yb7	yb8	yb9	yb10	yb11	yb12	yb13	yb14
yb1	1.000													
yb2	0.644	1.000												
yb3	0.768	0.626	1.000											
yb4	0.736	0.563	0.802	1.000										
yb5	0.634	0.507	0.677	0.806	1.000									
yb6	0.608	0.492	0.656	0.687	0.654	1.000								
yb7	0.654	0.508	0.619	0.675	0.622	0.757	1.000							
yb8	0.655	0.546	0.656	0.643	0.653	0.731	0.752	1.000						
yb9	0.623	0.557	0.587	0.677	0.718	0.686	0.716	0.721	1.000					
yb10	0.708	0.533	0.746	0.735	0.696	0.619	0.620	0.756	0.685	1.000				
yb11	0.703	0.549	0.696	0.728	0.653	0.709	0.659	0.775	0.713	0.801	1.000			
yb12	0.693	0.572	0.697	0.698	0.673	0.657	0.600	0.677	0.684	0.785	0.789	1.000		
yb13	0.599	0.601	0.555	0.581	0.552	0.586	0.591	0.574	0.610	0.647	0.671	0.727	1.000	
yb14	0.678	0.556	0.571	0.577	0.513	0.624	0.594	0.622	0.590	0.642	0.669	0.660	0.717	1.000