

IBN HALDUN UNIVERSITY  
SCHOOL OF GRADUATE STUDIES  
MASTER OF ARTS IN MANAGEMENT

THESIS

**DO MOBILE MONEY SAVINGS PLAY A  
MODERATING ROLE FOR FINANCIAL INCLUSION  
IN GHANA?**


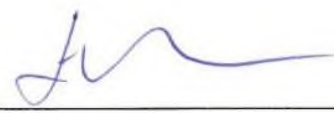
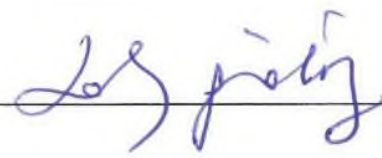
MOHAMMED ANDANI HUSSEIN

JUNE 2019

## APPROVAL

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of .....

Examining Committee Members:

	OPINION	SIGNATURE
PROF. MUSTAFA K. YILMAZ (Thesis Advisor)	<u>Approved</u>	
PROF. EKREM TATOGLU	<u>Approved</u>	
PROF. LOKMAN GUNDUZ	<u>Approved</u>	

This is to confirm that this thesis complies with all the standards set by the Graduate School of Business, Ibn Haldun University:

Date

05.08.2019

Seal/Signature



## PLAGIARISM CLEARANCE PAGE

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work

Name and Surname: Mohammed Andani Hussein

Signature:

A handwritten signature in blue ink, appearing to be 'Mohammed Andani Hussein', written in a cursive style.

## ABSTRACT

Do Mobile Money Savings Play a Moderating Role for Financial Inclusion in Ghana?

Hussein, Mohammed Andani

MA in Management

Thesis Advisor: Prof. Mustafa Kemal Yilmaz

June, 2019, 52 Pages

In recent years, financial inclusion has become one of the main concern for policy makers especially in emerging markets across the world. Researchers have expressed different opinions on the most effective way to achieve this goal. In this regard, one tool thus far, that has proven to be effective is mobile money for which African region leads the world. This study investigates the impact of mobile money on the savings behavior of users in Ghana in the light of the Life-Cycle-Hypothesis.

**Originality:** Most studies in this field are based on the Technology Adoption Model (TAM) or its variants. We deviate from this approach to explore specifically the factors that influence the savings behaviour of mobile money users and the extent to which it helps people to save by conducting a questionnaire. To the best of our knowledge, this is the first study of this nature held for a West African country.

**Findings:** The findings of the study reveal that mobile money has significant influence on the savings behavior of users in Ghana. The results also show that demographic attributes such as age, marital status, risk aversion, as well as the availability (access to) of formal financial institutions and products are the major drivers of savings behavior of mobile money users in Ghana.

**Practical Implications:** The findings of the study will be of significant use to policy makers who seek to increase economic growth through financial inclusion. It will also serve as a guide to regulators of financial institutions and mobile network operators to create a fair level playing field to enable more people to reach financial services in a an easier and convenient way.

**Keywords:** Mobile Money; Ghana; Africa; Financial Inclusion; Banking; Mobile Phone

## ÖZ

### Mobil Para Gana’da Tasarruf Egilimini Arttırarak Finansal Kapsayicilikta Kolaylastirici Bir Rol Oynuyor mu?

Hussein, Mohammed Andani (İşletme Yüksek Lisansı)

Tez Danışmanı: Prof. Dr. Mustafa Kemal Yılmaz

Haziran, 2019, 52 Sayfa

Son yıllarda dünya genelinde, özellikle gelisen piyasalarda finansal kapsayicilik politika yapicilar acisindan uzerinde onemle durulan konulardan biri haline gelmistir. Araştırmacılar bu hedefi en dogru bir sekilde gerceklestirmek icin farkli alternatiflerin arayisi icine girmislerdir. Bu kapsamda, Afrika bölgesinin dünyanın liderligini yaptigi mobil para kullanimi onemli mekanizmalardan biri olarak on plana cikmistir. Bu çalışma, Yaşam Döngüsü Hipotezi ışığında mobil paranın Gana’daki kullanıcıların tasarruf davranışı üzerindeki etkilerini incelemektedir.

**Özgünlüğü:** Bu alandaki çoğu çalışma Teknoloji Adaptasyon Modeli’ne (TAM) veya onun farkli versiyonlarına dayanmaktadır. Calismada kullanılan yaklaşımlar ise, özellikle mobil para kullanıcılarının tasarruf davranışlarını etkileyen faktörleri, kullanıcılara bir anket calismasi yaparak ortaya koymaya calismaktadır. Bilgimiz dahilinde bu calisma, bir Batı Afrika ülkesi için bu alanda yapılan ilk çalışma niteligindedir.

**Bulgular:** Çalışmanın bulguları, mobil paranın Gana’daki kullanıcıların tasarruf davranışları üzerinde pozitif etkisi olduğunu ortaya koymaktadır. Sonuçlar; yaş, medeni hal, riskten kaçınma, finansal kurumlara erişilebilirlik ve sunulan finansal ürünler gibi faktörlerin Gana’daki mobil para kullanıcılarının tasarruf davranışlarına etkisi olduğunu göstermektedir.

**Pratik Uygulamalar:** Bu çalışmanın bulguları, ekonomik büyümeyi finansal kapsayıcılık yoluyla artırmayı hedefleyen politika yapıcılar için önem arz etmektedir. Bu çalışma aynı zamanda, finansal kurumların düzenleyicileri ve mobil ağ sağlayıcılar için adil ve düzeyli bir ortam yaratarak daha fazla insanın finansal hizmetlere daha kolay ve uygun koşullarla ulaşabilmelerinin sağlanması için de bir rehber niteliği taşımaktadır.

Anahtar Kelimeler: Mobil Para; Gana; Afrika; Finansal Kapsayıcılık; Bankacılık; Cep Telefonu

## DEDICATION

This work is dedicated to my lovely and visionary mother, Mariyama Pagzegu who has committed everything to ensure that I succeed in my education. O Lord, show mercy on her as she has nourished me when I was young.

## ACKNOWLEDGEMENT

“All praise and thanks are due to Allah, the Lord of existence, the most Gracious, the most Merciful”. Throughout the process of writing this thesis, a number of people contributed in diverse ways to make it a reality. I give sincere thanks to and acknowledge the immense contribution of my supervisor Prof. Mustafa Kemal Yilmaz. His swift replies and his patience to read through my work painstakingly deserve a worthy mentioning.

I am also grateful to Prof. Ekrem Tatoglu, Prof. Selim Zaim and Prof. Nihat Gumus for their contributions at various stages of this work. Last but not least important, my gratitude goes to my colleagues and friends for their moral support and for reading through the manuscript. Particularly, I acknowledge the support received from Iddrisu Mohammed Kambala, Mariam Yasmin, Ambreen Sultan, Aysenur Beder and Aleem Abdul Kareem.

MOHAMMED ANDANI HUSSEIN

ISTANBUL, 2019



## TABLE OF CONTENTS

ABSTRACT .....	iv
ÖZ .....	iv
DEDICATION .....	v
ACKNOWLEDGEMENT .....	viii
TABLE OF CONTENTS .....	ix
LIST OF TABLES .....	x
LIST OF FIGURES .....	xi
LIST OF SYMBOLS AND ABBREVIATIONS .....	xiii
CHAPTER 1 INTRODUCTION .....	1
1.1 Background of the Study .....	<b>Hata! Yer işareti tanımlanmamış.</b>
1.2 Definition of Mobile Money .....	2
1.3 Historical Development of Mobile Money .....	3
1.4 Problem Statement .....	6
1.5 Rationale of the Study .....	7
1.6 Research Question .....	8
1.7 Hypothesis .....	9
1.8 Scope and Limitation of the Study .....	9
1.9 Organisation of the Study .....	9
CHAPTER 2 MOBILE MONEY IN GHANA .....	11
2.1 Mobile Network Operators .....	11
2.1.1 MTN Mobile Money .....	12
2.1.2 Vodafone Cash .....	13
2.1.3 AirtelTigo Cash .....	<b>Hata! Yer işareti tanımlanmamış.3</b>
2.2 Modus Operandi of Mobile Money .....	<b>Hata! Yer işareti tanımlanmamış.3</b>
2.3 Understanding the Mobile Ecosystem .....	<b>Hata! Yer işareti tanımlanmamış.</b>
2.4 Regulatory Overview .....	<b>Hata! Yer işareti tanımlanmamış.6</b>
2.5 Mobile Money Charges .....	<b>Hata! Yer işareti tanımlanmamış.</b>
CHAPTER 3 LITERATURE REVIEW .....	19
CHAPTER 4 DATA AND METHODOLOGY .....	25
4.1 Research Design .....	25
4.2 Data Collection .....	26

4.3 Survey and Sampling Process .....	27
4.4 Variables.....	28
4.4.1 Independent Variables.....	28
4.4.2 Control Variables.....	29
4.5 Crombach’s Alpha.....	31
4.6 Theoretical Framework .....	32
4.7 OLS .....	33
CHAPTER 5 EMPIRICAL FINDINGS .....	36
5.1 Descriptive Statistics .....	36
5.2 OLS Preliminary Analysis .....	37
5.3 Empirical Results .....	39
5.4 Mediating Role of Access to Mobile Phone.....	45
5.5 Robustness Check Results.....	46
CHAPTER 6 CONCLUSION.....	49
REFERENCES .....	53
APPENDIXES .....	58
CURRICULUM VITAE.....	64

## LIST OF TABLES

Table 1: Comparison of MM Agents and Commercial Banks in Ghana .....	<b>Hata! Yer işareti tanımlanmamış.</b>
Table 2a: Charges at an Agent .....	<b>Hata! Yer işareti tanımlanmamış.</b>
Table 2b: Personal Transaction Charges.....	<b>Hata! Yer işareti tanımlanmamış.</b>
Table 3a: Summary of Reports.....	21
Table 3b: Summary of Academic works on MM.....	22
Table 4: Definition and Expected Signs of Variables.....	30
Table 5: Reliability Statistics .....	32
Table 6: Variance Inflation Factor .....	38
Table 7.1: OLS Regression (MMaccess) .....	39
Table 7.2: OLS Regression (Phoneaccess) .....	40
Table 7.3: OLS Regression (Age and Age-Squared) .....	41
Table 7.4: OLS Regression (Marital Status) .....	<b>Hata! Yer işareti tanımlanmamış.</b>
Table 7.5: OLS Estimation (All Variables Combined) .....	43
Table 8a: Indirect Effects .....	45
Table 8b: Direct Effects .....	46
Table 9: Robustness Check Results .....	49

## LIST OF FIGURES

	<b>Page</b>
Figure 1: MM Global Market Distribution .....	5
Figure 2: Registered MM Accounts in SSA .....	6
Figure 3: Mobile Money Use Cases .....	7
Figure 4: How Mobile Money Works .....	14
Figure 5: Mobile Money Ecosystem .....	15
Figure 6: Graphical Representation of the Conceptual Model .....	28
Figure 7: Age .....	35
Figure 8: Monthly Income .....	36
Figure 9: Marital Status .....	36

## LIST OF SYMBOLS AND ABBREVIATIONS

AML	Anti-Money Laundry
ATM	Automated Teller Machine
BLM	Bank Led Model
BoG	Bank of Ghana
CGAP	Consultative Group to Assist the Poor
FAS	Financial Access Survey
FGD	Focus Group Discussion
GCB	Ghana Commercial Bank
GDP	Gross Domestic Product
GHS	Ghana Cedis
GSMA	Groupe Special Mobile Association
ICT	Information and Communication Technology
IFC	International Finance Corporation
IMF	International Monetary Fund
LCH	Life Cycle Hypothesis
MFIs	Micro-Financial Institutions
MM	Mobile Money
MNOL	Mobile Network Operator Led
MNO	Mobile Network Operators
MoMo	Mobile Mobile
NGO	Non Governmental Organisation
OIM	Observed Information Matrix
OLS	Ordinary Least Squares
OTC	Over the Counter
OVb	Omitted Variable Bias
PwC	Pricewater Coopers
SDG	Sustainable Development Goals
SIM	Subscriber Identity Module
SME	Small and Medium Size Enterprises
SSA	Sub-Sahara Africa
TAM	Technology Adoption Model
UN	United Nations
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Background of the Study**

Financial inclusion has become a vital concern of policy makers in the last decade all over the world since it plays an important role in realizing United Nations Sustainable Development Goals (UN SDGs) and thus, economic development of the countries. This concern especially stems from the fact that nearly 2 billion people globally are unbanked according to the World Bank Report (World Bank, 2018). Most of these people live in developing countries in Asia, Eastern Europe, Africa, Middle East and Latin America. Experts argue that these countries could mobilize their domestic funds for economic development if they increase access to financial services by using alternative means. In this respect, Mobile Money (MM) seems to provide a viable tool for promoting financial inclusion to meet that goal in developing countries.

Apparently, a sound financial system that serves the needs of the society should provide opportunities for savings mobilization, credit extension, and new products for payments. This will surely contribute to and facilitate economic activity. Such a system would also benefit the poor and financially marginalized people provided that it allows for a broader access to the financial system (Demirguc-Kunt and Klapper, 2012; Jenkins, 2008).

The emergence and widespread adoption of mobile phones and subsequently MM has just provided that opportunity. For instance, in 2017, the number of people with mobile phones globally exceeded 5 billion, 3.7 billion of it residing in developing countries. This number is estimated to reach nearly 6 billion by 2025 according to the GSMA Report (GSMA, 2018b).

Thus, the majority of the unbanked people have at least access to mobile technology. This shows the potential of MM as a financial innovation mean as well as its mediating role for financial inclusion. In recent years, the most important innovation that has attracted the attention of finance experts across the world is MM and GSM Association report by Page et al. (2013) underlies this fact by the following statement; *“transformational service that uses ICT and non-bank retail channels to extend the delivery of financial services to clients who cannot be easily reached with traditional banking system”*

## **1.2 Definition of Mobile Money**

Jenkins (2008) defined MM as *“money that can be accessed and used over mobile phone”*. It can also be defined as electronic money that can be transmitted and used over a mobile network platform without necessarily linking to a bank account. This definition clarifies the distinction between MM and mobile banking. MM can be used for local and international remittance, payroll deposits, bill payments, loan receipts and re-payments, groceries, top up airtime, to buy tickets and government bonds.

In Ghana, MM is defined as an electronic cash backed by equivalent amount of the Bank of Ghana (BoG) notes and coins stored using SIM in a mobile phone as identifier (BoG, 2017). Diniz, Porto de Albuquerque, and Cernev, (2011) described MM as:

*“Electronic money – being essentially digital – has attributes related to mobility and portability, and is equivalent to mobile-money or mobile-cash. It can be differentiated from other means of electronic payment (such as credit cards, debit cards, smart cards, etc.) because of its ability to replicate the essential attributes of traditional money, such as liquidity, acceptability and anonymity.*

*Mobile money may be related to mobile wallet, which refers to a digital repository of electronic money developed and implemented on mobile devices, allowing peer-to-peer transactions (P2P) between mobile devices (M2M) from users of the same service. It is similar to a normal physical wallet and is able to store money and credit and debit cards.”*

From these definitions, MM may be categorized into two: The first one is an over-the-counter transaction. In this case, the customer goes to an agent or merchant who executes the transaction on the behalf of the customer. A token which is a secret pin relating to the transaction is generated. In case of sending money to a third party, the pin, so generated, can be used to collect the money by the receiver at any mobile money vending desk. The second category is where customers have their own mobile money accounts. In this case, they can convert physical cash into e-cash, which can then be stored in their wallet and used whenever they need it. Each customer has his wallet and a password known to him alone. A mobile wallet is a kind of digital form of the wallet people carry in their pockets. It performs similar functions like a physical wallet or even more. These functions include storing money and keeping records of expenses.

### **1.3 Historical Development of Mobile Money**

Just like its definition, the historical development of MM can vary depending on the definition one uses. In general, mobile financial service systems can be subdivided into mobile banking and mobile payment models. The former allows bank account holders to use their mobile phones to access their existing bank accounts and associated services. The latter, on the other hand, allows the unbanked to access and benefit from financial services without having a bank account using their mobile phones (Porteous, 2006; Dias and Mckee, 2010; Weber and Darbellay, 2010, BoG, 2017). While some academicians approach the topic from mobile banking perspective, others take the perspective of mobile payments like MM.

When we look at the initiation of this innovation, we observe that the first step was taken in Finland. In 1995, Merita Bank of Finland used SMS to alert its customers of their accounts balances and any updates. This was the first time mobile phone related financial innovation was used (Nofie, 2018). The second phase of the development occurred in the Philippines in 1998 where subscribers used SMS to pass credit among themselves in exchange for goods and services. This practice evolved into a stage where users convert credit/top up airtime to money according to Lallana (2004). This

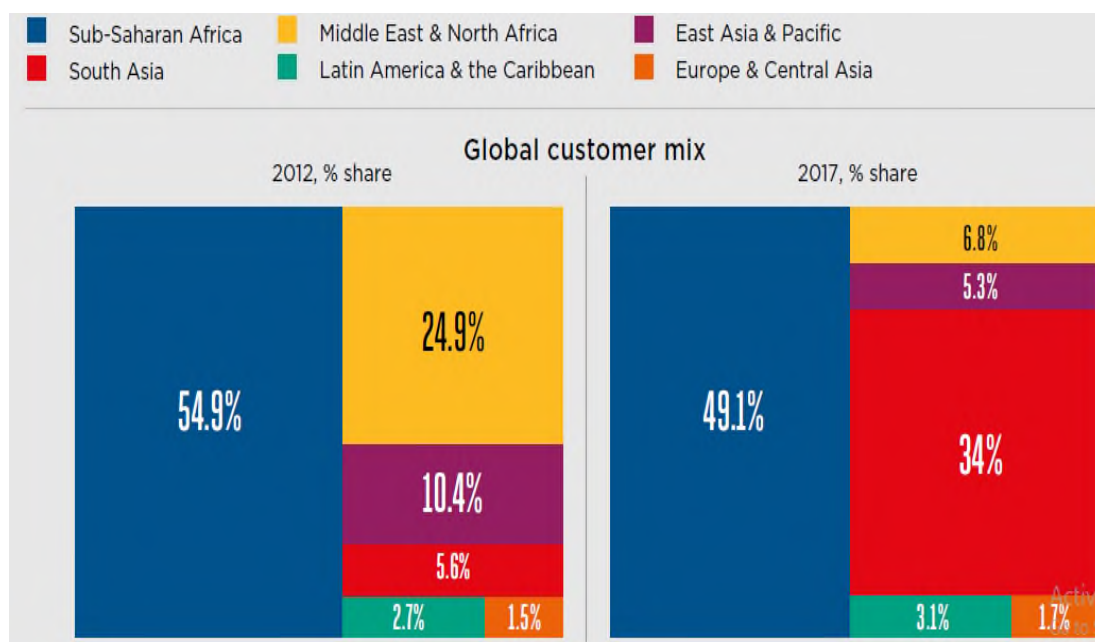


may be accepted as the real development of mobile money as we know it today. This form was developed by Globe Telecom in collaboration with rural banks in the Philippines and launched in 2006 marking new era of a technology yet to storm the world.

The story of MM in Sub-Sahara Africa (SSA) began with Safaricom, the developer and provider of M-Pesa, in Kenya in 2007. M-pesa was developed to provide financial services to people with limited or no access to formal financial institutions. By 2016, it served about 80% of the adult population in Kenya. Its story today, by far, has made it a global success. M-pesa has become the epitome of success in mobile technology innovation not only in Africa, but all over the world. As of 2018, it processes about \$162 million worth of transactions a day for its subscriber base of 23 million people in Kenya. The success of Safaricom in Kenya has stimulated global interest in mobile money and has led to a development of more sophisticated, interconnected mobile payment ecosystem across the world. Today, the global mobile money industry processes USD 1 billion worth of transactions per day growing from USD 139 million in 2012 to USD 690 million in 2017 (GSMA, 2017) with SSA leading the market. SSA had about 55% share of the global customer mix as of 2011. This share declined as new giants have emerged into the market from Brazil to India. By 2017, SSA only controls about 49% of the market. The global share of MM market in terms of customer mix is shown in Figure 1.

Since its inception, MM has also witnessed an overwhelming growth of transactions volume by 21 percent reaching USD 3.7 trillion, and contributing 4.5% of the global GDP in 2017. Its share in the global GDP is expected to reach 5% by 2022 (GSMA, 2018a). This financial innovation now operates in 90 countries with about 630 million accounts. More than 136 new accounts were added in 2017 alone.

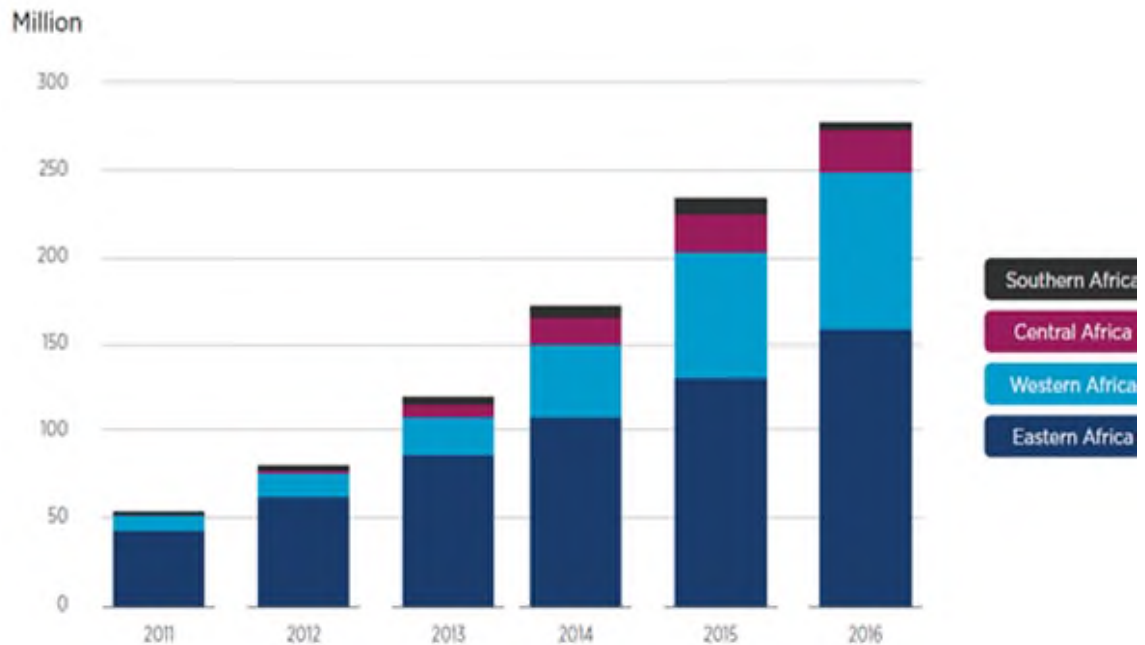
Figure 1: MM Global Market Distribution



Source: GSMA, 2017

Over the last decade, SSA has witnessed an exponential growth in terms of registered MM accounts (Figure 2). By 2011, when countries in the region began to develop and launch mobile financial services, the customer base was only about 50 million. This figure was nearly 300 million by 2017 with 30 new accounts opening every minute in the past five years. However, in terms of transaction values, SSA is still lagging behind. One reason for low transaction values may be that most users in the region use mobile money for subsistence motives. Another reason may be due to weak economies in this region.

Figure 2. Registered MM Accounts in SSA

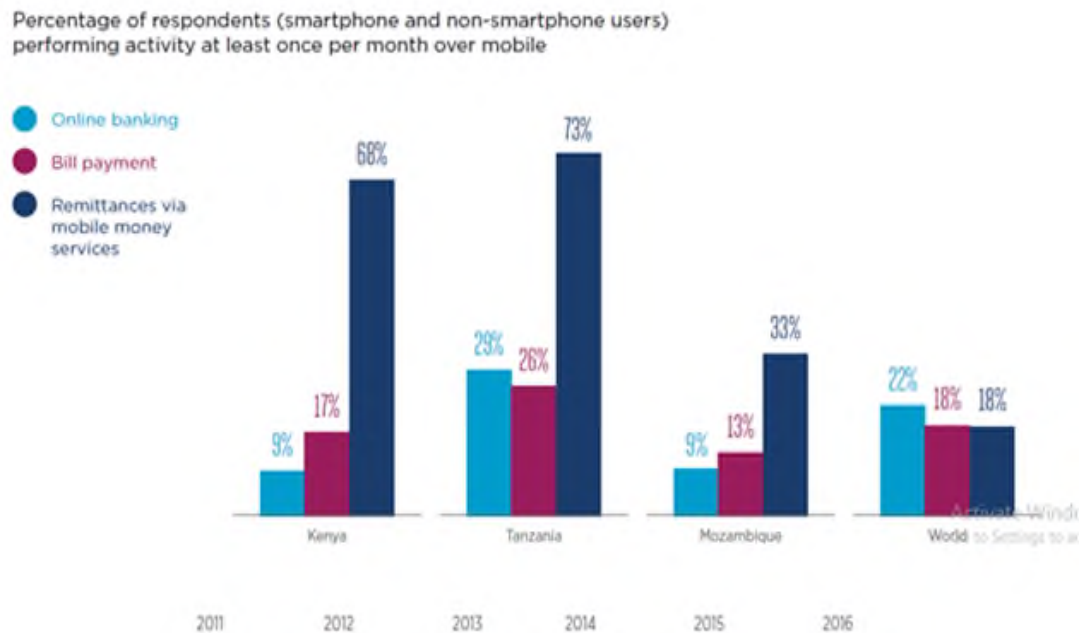


Source: GSMA 2018

#### 1.4 Problem Statement

Mobile Money is usually used for funds transfers and cash-in-cash-out transactions. Remittances, a form of funds transfer transactions, dominate MM transactions (Figure 3). These over-the-counter (OTC) transactions might be a problem in ensuring financial inclusion deepening which goes beyond funds transfer and OTC to include savings, credits and insurance policies. For MM to be a tool for poverty alleviation, financial inclusion and economic growth, it should prove itself effective in savings mobilization.

Figure 3. Mobile Money Use Cases



Source: GSMA Report 2018

Closely related to this, Jenkins (2008) postulated that financial access can help the poor and marginalized people to save and get credits to cushion themselves against unexpected events. However, rather than increasing savings and by extension facilitating credit availability, some people have argued that financial access through mobile money, like other financial innovations (eg. credit card), significantly increases indiscriminate spending behavior. It is on this premise that this study investigates empirically the effect of mobile money usage on the savings behavior of users in Ghana.

### 1.5 Rationale of the Study

MM experts and service providers enumerate the prospects of MM ranging from economic growth, financial inclusion to its ability to provide financial shield against economic shocks for individuals and families. To promote its economic growth, financial shield and business expansion functions, MM should demonstrate not only convenience and availability, but also an understandable level of positive effect on users' ability to accumulate wealth through savings. This study would be the first

attempt of its kind to investigate and explore that ability for a West African country. Since MM is part of a large payment ecosystem connected to the banking system which many hitherto did not have access to, we will examine the extent to which MM enables users, the banked, unbanked, and the underbanked, to save and have access to financial services more often in order to increase their wellbeing. In examining MM, traditional Technology Adoption Models (TAM) (Davis, 1986) or its variant forms have been employed by various researchers. Though this model is important as it shows the diffusion of a technological innovation, it does not capture its socio-economic benefits. Besides, Dahlberg et al., (2015) claimed that MM consumer studies based on this model are just reinventing the wheel. Consequently, our study deviates from the TAM models and focuses more on the economic aspects of MM to serve as a tool for savings mobilization.

## **1.6 Research Question**

The key research question seeks to investigate the determinants of savings behavior of mobile money users. It examines the role mobile money can play in promoting and deepening of financial access in Africa. It also empirically analyses the relationship between savings behavior and use of MM, accounting for the mediating role of phone ownership. Along this, it looks at the impact of mobile money usage on the savings attitude of users.

## **1.7 Hypothesis**

Georgina and Eric (2018) using students of the University of Ghana found that access to mobile phones influences the spending behaviour of students. Another study by Shem, Teresa and Maureen (2017), using FinScope data for Kenya, argued that MM could be used as an effective tool for savings mobilization. Based on the research question, we state our hypothesis as follows:

H1: Access to and use of MM significantly and positively influences users' attitude to savings

H2: Availability of alternative financial services tools in a local market or districts influences savings on MM.

H3: The relationship between savings behavior and access to MM is mediated by phone ownership.

### **1.8 Scope and Limitations of the Study**

Geographically, the study is limited to Ghana. Also, the study uses primary data gathered by the researcher since we could not have access to bank level data from the Bank of Ghana. Policy makers in Ghana are making tremendous efforts to use MM as a tool for achieving the UN SDGs, particularly financial inclusion. The findings of this study will help them to make a fair assessment of policy implications of MM especially with regard to policies aiming at savings mobilization. In a similar way, policy makers are concerned with creating regulatory framework that allows for a fair level playing field for both network operators and banks. This study will also contribute to the efforts of policy makers in this angle.

One important distinction of the study is that it deviates from most of the previous studies in this field on some aspects. Dahlberg, Guo and Ondrus (2015) noted that majority of researches on mobile payments focus on consumer adoption based on Technology Adoption Model (TAM) or its variant models. Our study did not include adoption and factors affecting it thereof. Since there exists a plethora of literature on mobile phone adoption, we limited our study to savings behaviour and its determinants. However, we take the previous savings activities of users, their perception of MM security, as well as their reasons for using MM into consideration.

### **1.9 Organisation of the Study**

The study is organized in six sections. Chapter One makes an introduction and gives a background about the motivation of the study, research question, hypothesis and scope. Chapter Two presents an overview of mobile money in Ghana and Chapter Three reviews the literature. Chapter Four gives the methodology of the study

including research design, sampling and techniques used for data analysis. Chapter Five discusses the empirical findings and finally, Chapter Six concludes.

## **CHAPTER 2**

### **MOBILE MONEY IN GHANA**

#### **2.1 Mobile Network Operators**

According to Jumia (2018), there are about 34.57 million mobile phone subscribers in Ghana indicating a 119 percent penetration rate with more than 10.11 million internet users. Out of this figure, 23.95 million phone subscribers also subscribe to mobile money account. For the last five years, there has been 30 new MM accounts registered every minute. Among the reasons why the MM has gained this widespread acceptance is its ease to use feature, which makes it eligible for users of all age groups and educational background. Other prominent reasons cited by Ghanaian users are its convenience and quick access.

MM in Ghana just like in other SSA countries is challenging referring to the boundaries set by conventional banks in all aspects of financial services. For instance, only 24.7% of people in Africa have access to financial institutions compared to the overwhelming number of people with mobile phones (Nyantakyi and Mouhamadou, 2015). In Ghana, while only 11.43 million of people have bank accounts, mobile phone penetration has exceeded 100 percent of the population and mobile money accounts double the number of bank accounts. Beside the growth in the number of accounts, the value of MM transactions grow reaching USD 3 billion in 2016.

Almost all mobile network operators (MNO) have mobile money platforms designed to attract, and serve their customers. MNOs are not only competing in attracting users, but also in widening the agent network even in the remote rural areas. As of 2018, the total MM merchants across the country exceeds 151,000 agent outlets. This number by far exceeds the 1,300 bank branches. Another fact pointing out to the frequent usage of MM is that while there are 11.53 ATMs per 100,000 adults, there exists 1,098.30 mobile money merchant/agents per 100,000 adults as of 2017 (Table 1). The following sections present an overview of the MNOs.



Table 1: Comparison of MM Agents and Commercial Banks in Ghana

<b>Year</b>	<b>ATMs Per 100,000 Adults</b>	<b>MM Agents Per 100,000 Adults</b>	<b>Commercial Bank Branches Per 100,000 Adults</b>
<b>2012</b>	5.46	55.45	5.67
<b>2013</b>	8.08	109.09	5.82
<b>2014</b>	8.13	163.40	6.04
<b>2015</b>	10.19	472.39	7.12
<b>2016</b>	11.15	790.70	7.13
<b>2017</b>	11.53	1098.30	8.60

Source: IMF FAS, 2018

### 2.1.1 MTN Mobile Money

MTN Mobile Money is the largest provider of mobile money services by far due to its large customer base and widespread mobile money agents. It has about 75,000 agents and more than 6 million active users. The subscriber base is estimated to be above 10 million people. MM services are provided in partnership with 10 banks. In 2017, MTN customers accounted for 90 percent of mobile money deposits with the Bank of Ghana. The transaction value is estimated to be GH¢2.1 billion (USD 442,105,206).

Apart from receiving and sending money, MTN users can pay their bills (e.g. DSTV, electricity, school fees) and can handle their insurance, salaries, tickets, and MTN stock purchases. For small business owners, MTN provides SIM cards by which they may receive

payments from their customers without paying any charges. It has brought banking very close to those who hitherto did not engage in formal banking institutions due to time or trust issues. In 2017 MTN in partnership with Fidelity Bank developed and launched the first interest earning mobile money deposit accounts. With this development, MTN customers start saving on their MM wallets and earn interest on their savings.

### **2.1.2 Vodafone Cash**

Vodafone, until July 2008, was *Ghana Telecom* (One touch). A British company, *Vodacom*, acquired 70% stake of it in 2008. Thereafter, it became the second largest MNO in Ghana until 2017 when it moved to the 3<sup>rd</sup> place in ranking. It is now the fastest and most secured mobile money platform in Ghana. Vodafone joined the mobile money market late. This is probably why it is the 3<sup>rd</sup> largest mobile money service provider in terms of market share.

### **2.1.3 AirtelTigo Cash**

Airtel was the second company that launched mobile money in 2010 after MTN. Tigo and Airtel were separate firms until their parent companies, Millicom International Cellular S.A., ‘Millicom’ and Bharti Airtel Limited ‘Airtel’ respectively decided to merge their operations in Ghana in 2017. As per the shareholders agreement, Millicom and Airtel have equal ownership and governance rights in the new entity, whose brand name is “AirtelTigo”. The new firm “AirtelTigo” is the second largest Mobile Network Operator in Ghana in terms of market share and agent based with a total subscriber base of nearly 10 million. From January to December 2017, AirtelTigo customers deposited GH¢79 million equivalent to 3.56 percent share of the mobile money deposits with the Bank of Ghana. In terms of number of partnership banks, it exceeds that of MTN. It has 11 partner banks.

## **2.2 Modus Operandi of Mobile Money**

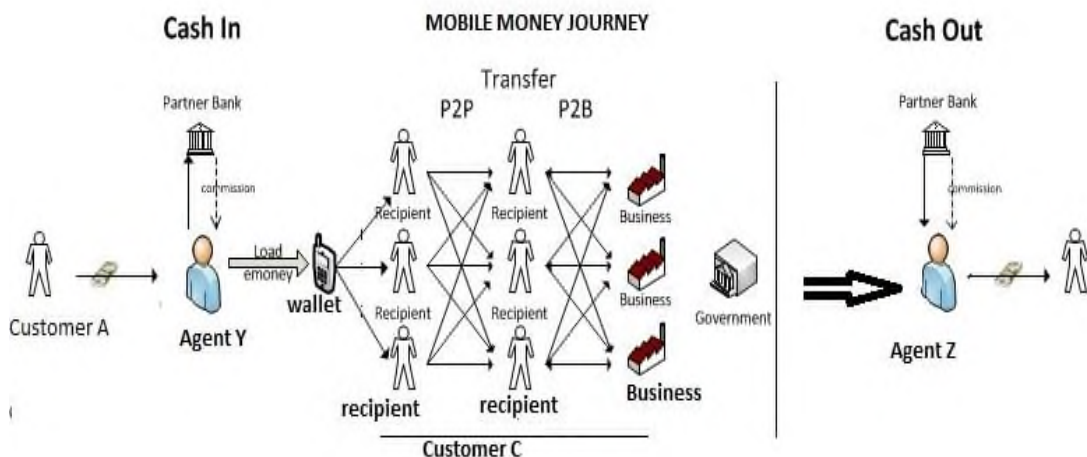
In this part, we present a snapshot of how the system operates. Figure 4 shows a brief description of how mobile money works from the client through the agent to the

banking system. Customers who want to load their wallets go to agents who act as middlemen between customers and partner banks. The interaction can be divided into cash-in and cash-out transactions. The steps followed on MM usage may be summarized by the following example:

- (1) Customer A gives cash to agent Y (this is called cash-in).
- (2) The cash is then converted into electronic money for customer A by agent Y.
- (3) The electronic money is loaded into the wallet of customer A. Agent Y takes to the partner bank for deposit the cash received less his commission.
- (4) Meanwhile, customer A can transfer to or use the e-money in his wallet to purchase goods, airtime or settle bills with customer C.
- (5) Customer C may be a person (P2P) or business entity (P2B) or even government (P2G). The payment received by customer C is in the form of e-money which can be converted into cash by visiting the nearest mobile money agent (Z). This is called cash-out transaction.
- (6) Customer A can also transfer e-money to customer B.

Some of these transactions are free, but others are subject to charges. For example, making transfer within the same network operator is not subject to charges. Interoperability regulations are expected to make it possible for subscribers of different network operators to be able to transact freely and conveniently.

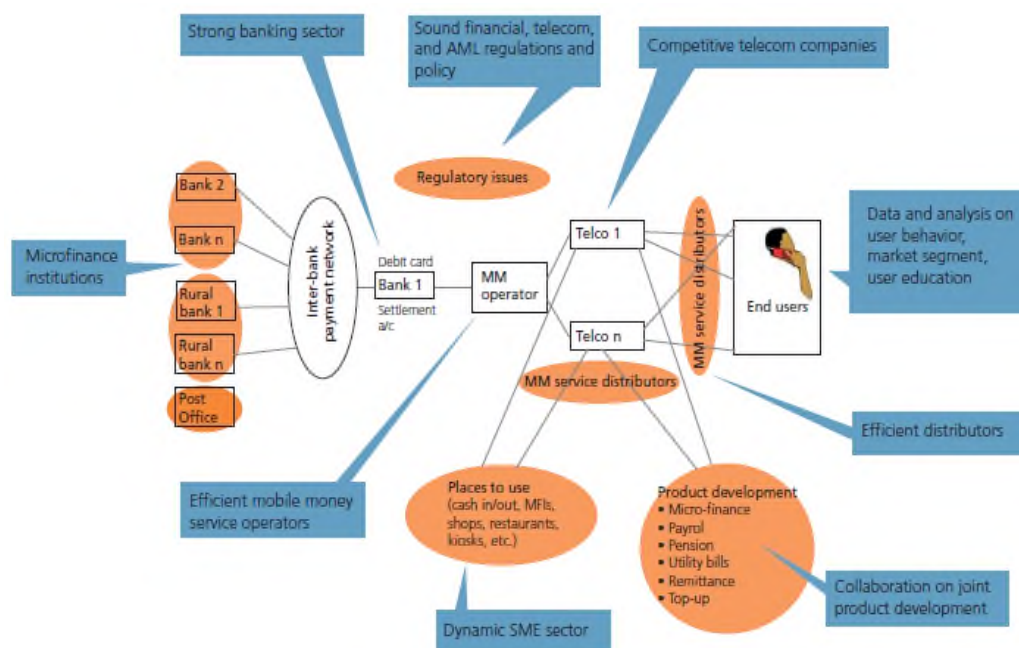
Figure 4: How Mobile Money Works



## 2.3 Understanding the Mobile Ecosystem

A proper understanding of the economic impact of MM requires an understanding of its ecosystem. This may be defined as a network of interconnected businesses, organizations, individuals and groups that work together to deliver financial services through MM. The proliferation of MM in Africa and in much of the developing countries is due to a thriving network of partnerships: Mobile Ecosystem. Currently, it includes mobile network operators, customers, agents/merchants, banks, retailers, utility companies, employers, regulators, donors, and non-governmental organizations (NGOs). As MM evolves, more members will be on the web in the future. Each member has a distinct interest, but these interests are interdependent. While financial access, security, convenience and easy to use are the primary concerns for the customer mobile network operators, agents, banks and a host of others seek to increase their market share and hence financial gain. Figure 5 depicts the interrelationship of the players of the mobile money ecosystem. The wider the Mobile Ecosystem becomes the more it will contribute to reducing financial exclusion, unemployment, and poverty.

Figure 5: Mobile Money Ecosystem



Source: Jenkins 2008 (IFC)

As Figure 5 shows, there is a complex web of relationship depicting the MM Ecosystem. The success of MM largely depends on these interactions. For instance, the relationship between the end user and the banking system is executed by MM operators and partner banks. This covers two possible combinations: bank led and MNO led models. Across the world, where MM operations adopt the operator led model, the success story has been largely visible. Failure has been recorded in countries where the bank led model was used. A typical example of this is Nigeria. The question one can ask is what factor or factors account for the superiority of MNO led model over the Bank led Model?

There are numerous reasons and not far-fetched. MNOs have the advantage over banks because of their wide network of agents. These agents are available even in less densely populated villages where it will not be cost efficient for banks to establish branches. This creates an extended reach of MNOs across customers and potential customers at all levels of income distribution: the nexus for financial inclusion.

## **2.4 Regulatory Overview**

The regulatory framework establishes two main dominant models of MM with a third less prevalent one: Bank led Model, Network Operator Led Model (Sandra, 2016) and Manufacturer Led Model. The first two are the most prevalent in Africa. They, therefore, fall within the scope of discussion.

With the Bank Led Model, the MM chain is established and dominated by the bank in question. This means that customer ownership and management is with the bank and not with the mobile network operator. This model has not been successful in Nigeria and some other places. Currently, it is implemented in Kenya where Equity Bank issues the so called “thin SIM” to customers for MM purposes. The “thin SIM” can be placed under customers’ already existing SIM without necessarily changing a network. This allows a user to benefit from MM services of Equity Bank while retaining his own mobile network operator.

The second model, Mobile Network Operator Led (MNOL), has been the most successful model so far. As the name suggests, it is provided and managed by telecommunication companies. The success of this model could possibly be attributed to several reasons. Among them, we may mention the large and visible investment by telecommunication firms in agent network. Agents are important intermediaries for the success of MM. The advantage of the MNOL lies in the interest of these agents in investing in this area unlike banks. Banks have not shown interest in investing in agents. Even if there is interest, regulatory restrictions may still limit the extent to which banks can pursue recruitment and deployment of agents.

Another regulatory issue worth to mention is the legal relationship that exist between mobile money operators, agents, and customers. First, mobile network operators are not licensed as deposit taking institutions in most jurisdictions. At least, this is true for Africa. Second, the money collected from customers is not “paid on terms”. This precludes any form of financial intermediation by telecommunication. The regulations require the money, so collected, to be kept in a trustee account.

## **2.5 Mobile Money Charges**

The charges associated with MM are important since they can potentially affect usage. The charges differ from one mobile network operator to another depending on the type of the transactions. Table 2a and 2b show the charges (transaction costs) in the market for MTN, the largest MM service provider by market size in Ghana. The information in Table 2a and 2b are related to a situation where the client carries out the transaction with an agent and with customers’ mobile phone (P2P) respectively. The information in these charges relate to a situation where the client carries out the transaction with an agent.

Table 2a Charges at an Agent

<b>Sending</b>	Charge	<b>Withdrawing</b>	Charge
<b>1 to 50</b>	2.50%	<b>1 to 50</b>	0.5%
<b>50+</b>	5%	<b>50+</b>	1%

Table 2b Personal Transaction Charges

<b>Sending</b>	Charge	<b>Withdrawing</b>	Charge
<b>1 to 50</b>	0.5%	<b>1 to 50</b>	0.5%
<b>50+</b>	1%	<b>50+</b>	1%

Generally, there are two main models for charges: slab-based pricing rate and percentage rate. The former involves charging a flat rate for transactions within a predefined range, while the later charges a flat percentage on the amount of transaction irrespective of the amount. Though some transactions are free, MM transactions often impose charges. These charges may negatively affect its potential in achieving financial inclusion. Moreover, where the fee structure is regressive, large amounts ask, in relative terms, less charges. This means that, the poor and financially marginalized people who transact in small amounts may end up paying more.

## **CHAPTER 3**

### **LITERATURE REVIEW**

As mobile phone usage becomes a natural part of human lives, experts are quick to point out its role in promoting opportunities for economically marginalized people in developing countries (Aker and Mbiti, 2010; Donner, 2006). In West Africa, researchers have indicated the social and economic benefits of mobile phones to urban and rural folks in Ghana and Burkina Faso (Sey, 2011; Hahn and Kibora, 2008). The swift penetration of mobile phone in Sub-Sahara Africa has had a positive impact on the adoption of MM for its traditional functions (Etim, 2011; Butler, 2005; Elijah and Ogunlade, 2006). Accessibility, convenience, easy to use as well as the ability of mobile operators to reach rural underserved or unserved sectors of the economy cannot be ignored in this process (Nofie, 2018; Shem and Rosner, 2003; Ghana Banking Survey, 2016). Hence, many people are optimistic that MM is the key to address the concern of policy makers and industry players in developing financial inclusion, which is quite vital in achieving Sustainable Development Goal 10. Studies held by many researches found that there is a positive relationship between MM usage and financial inclusion (Bold et al.2012; Jenkins, 2008; Porteous, 2006, and Ehrbeck et al., 2012) because MM mainly targets the unbanked and mostly rural, low income earners while banks mostly target middle income and the elite of the society. Dias and Mckee (2010) found that the unbanked mobile money users use it for bill payments, international remittance, airtime purchases, groceries, loan receipts and payments among many other transactions.

In a survey, Mbiti and Weil (2011) found an increasing use of MM in Kenya (M-Persa) as a storage tool of wealth among people compared to the traditional savings products. In a policy research working paper, Demombynes and Thegeya (2012) examined, among other factors, the impact of gender and marital status on MM usage in Kenya using a survey data for 2010. Specifically, they found that married males in rural areas have high probability to save by using MM. Similarly, education and income level



were also found to be important factors influencing the access to and use of formal banks (Jack and Suri, 2011; Shem et al. 2017). The same is true for access to and use of MM. Shem et al. (2017) analyzed the saving behavior of mobile money users in Kenya and found that the use of MM has significant impact not only on the amount saved, but also whether people save or not.

In South Africa, Bankole and Bankole (2017) asserted that the adoption and use of mobile phone is influenced by socio-technological and cultural factors. Jan and Augustina (2018) investigated the factors that determine the difference in the rate of penetration and adoption of MM in Nigeria and Kenya and they found that network externalities act as the major determinant. Network externality refers to the demand side economies of scale. As more and more individuals use MM, the more benefits accrue to members of the mobile ecosystem.

To what extent does the development of MM affect the banking system? In an attempt to find out the opportunities and threats presented by MM, some researchers examined MM in the light of potential threats and opportunities to banks and the banking system. They argued that new technological innovation always presents some threats and opportunities to existing firms and most of the bank executives in Ghana see MM as presenting opportunities rather than threats (Lai 2006; 2007; 2016). Ghana Banking Survey by PwC (2016) indicated that the emergence of MM creates an opportunity for MNOs and banks to partner. This partnership could serve for a number of purposes including the delivery of financial services to remote and less densely populated communities. More importantly, it will serve as a nexus for promoting a cashless society. To this end, bank executives call for the establishment of partnerships and fair regulations to create a level playing field for network operators and banks. Some experts, however, push regulators to consider the needs of the unbanked and financially excluded masses as the key driver of policies. Thus, the regulatory environment can also play a vital role in accelerating the penetration of MM, the profitability of market players and financial inclusion (Nofie, 2018; PwC, 2016).

Notwithstanding the potential of MM, there exists considerable studies in the literature arguing that financial innovations with a potential to promote cashless society also promote high spending behavior. For example, Huck (1976) pointed out that credit cards could increase the tendency to spend. The same argument is repeated by Feinberg (1986). Using students as the sample and credit cards as the stimuli, Feinberg concluded that the presence of credit cards increases the amount of spending by the students. More recently, a study by Koloba (2018) found credit card usage to have negative impact on generation Y students' savings behavior in South Africa.

In a study where they used students of University of Ghana, Georgina and Eric (2018) assessed the effect of MM on the spending behavior of students and found that the students who use MM are far more likely (10 percent more) to spend than their counterparts who did not have it.

It is important to point out that most of the studies on MM focuses on technology adoption. In a systematic literature review, Dahlberg et al. (2015) analyzed 188 articles published during (2007-2014), consisting of both conference and journal publications and concluded that the majority of these publications are on MM (phone) adoption and factors that affect it thereof. The same study also highlighted the fact that "security" and "trust" are the most common adoption factors that researchers have examined. Tables 3a and 3b give a summary of the reports and academic studies held on mobile money.

Table 3a. Summary of Reports on MM

Report/Authors	Methodology	Region	Findings
2016 Ghana Banking Survey (PwC, 2016)	Survey	Ghana	MM creates opportunity for partnership and fair regulation. MM is easy to use and accessible
Nyantakyi and Mouhamadou (2015) AfDB	Report		24.7% of people in Africa have access to financial institutions
GSMA (2017)	Report	Global	Enabling regulation has material influence on market outcomes: profitability. MM presents opportunities
Jenkins (2008)	Report		MM reduces poverty through savings or credit MM helps to reduce vulnerability

CGAP (2009)	Report		Low income Filipinos use MM predominantly for remittance 12% of low income unbanked users in Philippines do not own a phone
Page, Molina, Jones, & Makarov (2013)	GSMA 2013 Report		“Transformational service that uses ICT and non-bank retail channels to extend the delivery of financial services to clients who cannot be easily reached with traditional banking system”
World Bank (2018)	Report		Tanzania became the first SSA country to permit interest payments on MM deposits. Saving balances remain low among low income earners despite the interest rate being four times higher than USA bank deposits.
GSMA (2016)	Report		30 new registered customers in West Africa per minute within the last five years Transactions are mostly basic uses including P2P transfers and airtime top up. West Africa accounts for 16% of users globally
Bank of Ghana, BoG (2017)	Vector Error Correction Model	Ghana	MM grows at a rate of 737.4% from 2012 to 2016 Bank of Ghana establishes clear distinction between MM and mobile banking

Table 3b Summary of Academic Literature

Authors	Methodology	Region	Findings
Feinberg (1986)	Observation	Undergraduate students	Credit card stimuli increases students spending behaviour
Makina (2017)	A review of Literature	Papers on financial access	MM innovation, has the potential to foster more inclusive financial systems
Koloba (2018)	Factor analysis and Single regression	South Africa	Credit card usage negatively impacts generation Y students' saving behavior in South Africa
Sabri and Macdonald (2010)	ANOVA and OLS regression	Malaysian students	Students with credit card did not save but rather spend indiscriminately
Teppa et al. (2013) Note. By European banks	Descriptive	European Economic Area	Marital status has a mixed effect on liquidity constraints. Divorced couples are more likely to report constraint and low assets at disposal. Higher degrees of education are associated with significantly lower probability of facing liquidity constraints.
Anoruo and Ahmad (2001)	Vector Error Correction Model	Congo Ivory Coast, Ghana, Kenya, South Africa and Zambia	There is bidirectional relationship between savings rate and economic growth for some countries. For other countries, domestic savings cause economic growth

Jan and Augustina (2018)	Comparative Case Study	Kenya and Nigeria	Different rate of adoption in Nigeria and Kenya MNOs excluded from operations in Nigeria; bank led model. Kenya uses MNOs led model. Network externalities affect MM
Etim (2011)	Descriptive	Nigeria	Mobile phones have the potential to increase business and entrepreneurial opportunities
Baro and Endouware (2013)	In-depth Interviews	Nigeria	MM improves livelihood of rural folk. MM saves transportation cost
Dahlberg and Oorni (2007)	Paired difference comparisons	Finland	Factors that affect acceptance of mobile payments include education, ease of use and internet skills
Steve (2017)	Ethnographic Data Analysis	Sierra Leone	MM usage empowers marginalized in society. MM leads to human developments
Shem et al. (2017)	Logit and OLS	Kenya	MM has potential to mobilize savings Marital status and education affect savings positively
Diniz, Albuquerque and Cernev (2011)	Review of Literature (2001-2011)		Research on MM regulation and socio-economic impacts is neglected Concentration on TAM (Technology Acceptance Model) Having a bank account negatively affects awareness of MM transfer services Sending and receiving is the most common use of MM in Kenya
Mbiti and Weil (2011)	Panel data approach	Kenya	M-pesa reduces reliance on traditional money transfers through buses and western union Only 26% of Kenyan users save on M-pesa
Jack and Suri (2011)	Descriptive	Kenya	Majority of users in Kenya save on Mpesa Most Kenyan users are male Income and gender affect adoption and savings on MM Those without bank accounts are more likely to save on M-pesa Reasons for adoption include ease of use
Butler (2005)			MM eradicates poverty. Swift adoption of phone in Africa
Demombynes and Thegeya (2012)	Descriptive	Kenya	M-pesa was originally developed for money transfer Many mobile users are men, the wealthy and urban dwellers 15% say they save with M-pesa in Kenya Less than one percent save with M-kesho

Aker and Mbiti (2010)	Exploratory	Africa	MM increases market efficiency More male than female users More urban users Mobile phone has become key tool for economic development/ Many poor people still do not have access to mobile phones NGOs use mobile money for money transfers.
Dias and Mckee (2010)	CGAP's Notes	Brazil, India, Kenya, and Peru	MM provides financial access to the unbanked and underbanked Poorly designed or timed regulation can impede progress
Elijah and Ogunlade (2006)	Descriptive analysis	Nigeria	Media and ICT play major role in disseminating information to rural communities in Nigeria ICT has empowered rural folks leading to their economic development
Shem and Rosner (2003)	Logit	Kenya	Gender and monthly income significantly determined the channel of saving Amount saved did not vary according to the saving channel Minimum account opening amount could negatively affect financial access
Demirguc-Kunt and Klapper (2012)	Descriptive	148 economies	Income levels and individual characteristics account for individual account ownership The following are reasons of financial exclusion: religious reasons, lack of trust\ lack of required documentation, distance, having a family member with a bank account.
Georgina & Eric (2018)	OLS	Students	MM increases spending behavior of students
Nofie (2018)	Case studies	Brazil, Kenya, Indonesia	MM triumphs where there is visible inequality between urban and rural communities Regulatory power has the potential to influence the ecosystem structure.
Bankole and Bankole (2017)	Structural Equation Modelling (SEM)	South Africa	Socio-technological and cultural factors affect the acceptance of MM and mobile phone in South Africa
Ggombe and Tomoya (2015)	Panel data approach; OLS and fixed effects estimation	Uganda	MM significantly increases the likelihood and frequency of receiving remittance MM reduces cost of remittances
Gichukia and Mulu-Mutukub (2018)	Probit and Tobit models	Kenya	Women are less likely to adopt mobile banking if they have hidden charges
Sandra (2016)	Qualitative interviews	Mexico and Kenya	She identifies two regulatory regimes: MNO led and Bank led models.

## **CHAPTER 4**

### **DATA AND METHODOLOGY**

This Chapter outlines the steps and procedures employed in gathering and analyzing the data. It consists of the research design, survey development, data collection, sampling, pilot study, theoretical framework and empirical model specification.

#### **4.1 Research Design**

We used quantitative techniques in the study. The data is collected by the researcher and a team of trained enumerators. The study area is limited to Ghana and we focus particularly on Greater Accra and Northern regions. To develop the survey, we take advantage of the existing literature. Some items from previous surveys were captured and modified to better measure savings behavior. In this regard, we benefited immensely from FinScope surveys. FinScope is an initiative of FinMark Trust. Its surveys are treated as the benchmark to explore financial inclusion, attitudes, behaviour and demographics. In the process of developing the survey, preliminary interviews and focus group discussions (FGD) were conducted in Tamale, Northern Ghana, from August to September 2018. FGD varied in sizes from 3 to 5 people.

We recorded the proceedings by the researcher's mobile phone. We held some discussions in English and others in local languages, where the people could not speak English. We deliberately included people who have no education or basic level of education to ensure a balanced discussion. The FGDs were made up of MM users, MM merchants and agents. We conducted the interviews with the employees of mobile network operators and approved vendors as well as roadside cash-in cash-out dealers. Approved vendors, here, refers to vendors that are allowed by mobile network operators to operate within their premises. We approached the participants randomly, except in the case of officers of network operators, who were selected by using purposive sampling. A purposive sample is a non-probability sample based on unique characteristics of a population and directly related to the objective of this study. The

selection of the officers of network operators was purposive because they have unique characteristics, knowledge and experience relevant to the study. In all cases, participation was purely voluntary. There were instances where some people who were contacted did not answer for reasons ranging from lack of spare time to employer related restrictions.

## **4.2 Data Collection**

We collected the data mainly from Accra and Tamale Metropolis as well as rural communities living in the northern part of the country. We selected these cities and surrounding villages because of their special characteristics that make them ideal representative sample for the population of Ghana. Accra is the capital city and affluent with high income levels, high access to formal financial services. Tamale, on the other hand, has mostly middle-income inhabitants, more conservative, poor rural communities with less access to formal financial services.

We measured access to formal financial services using the number of ATMs and bank branches of the largest bank in Ghana by capital and number of branches, namely Ghana Commercial Bank (GCB). GCB has nine branches and 16 ATMs in the northern region covering a land size of 70,384 square kilometres (31% of Ghana), consisting of 26 districts. Nofie (2018) argued that mobile payment system is far more likely to succeed as an innovation in communities that lack access to financial services and where inequality between rural and urban areas is remarkable. Accra and Tamale, therefore, serve as a representative sample for the population of Ghana since they meet the conditions set forth by Nofie (2018).

We managed the questionnaire in two different forms. The first set, targeting participants with some level of education, was sent by an e-mail and WhatsApp randomly. The second set, targeting everybody including those with or without education, was conducted with the assistance of two trained enumerators, who explained the questionnaire in the local language (Dagbani) where participants had no education. The right coverage method was used in managing the questionnaire in

Tamale, Accra and surrounding villages. The right coverage method involves choosing a designated landmark such as market, bus station as the starting point of a survey and then moving to the right side of it. We identified main landmarks like market and village community centers. In the villages, the trained enumerators started from the identified landmark and moved to the right side stopping at every 3<sup>rd</sup> house. We used similar approach in the cities with slight differentiation: the enumerators started to conduct the survey from the popular and crowded places like markets, bus stations and shopping malls and then they moved to the right approaching every fifth person. We conducted the questionnaire to the individuals rather than households since MM usage usually takes place at individual level. Since participation was voluntary, some people refused to take part. We made sure that the sample includes both employed and unemployed people since this is a key determinant of income level, which in turn affects savings behavior. During the analysis, there was no significant difference between two data sets, namely those sent through e-mail and those gathered by the enumerators.

#### **4.3 Survey and Sampling Process**

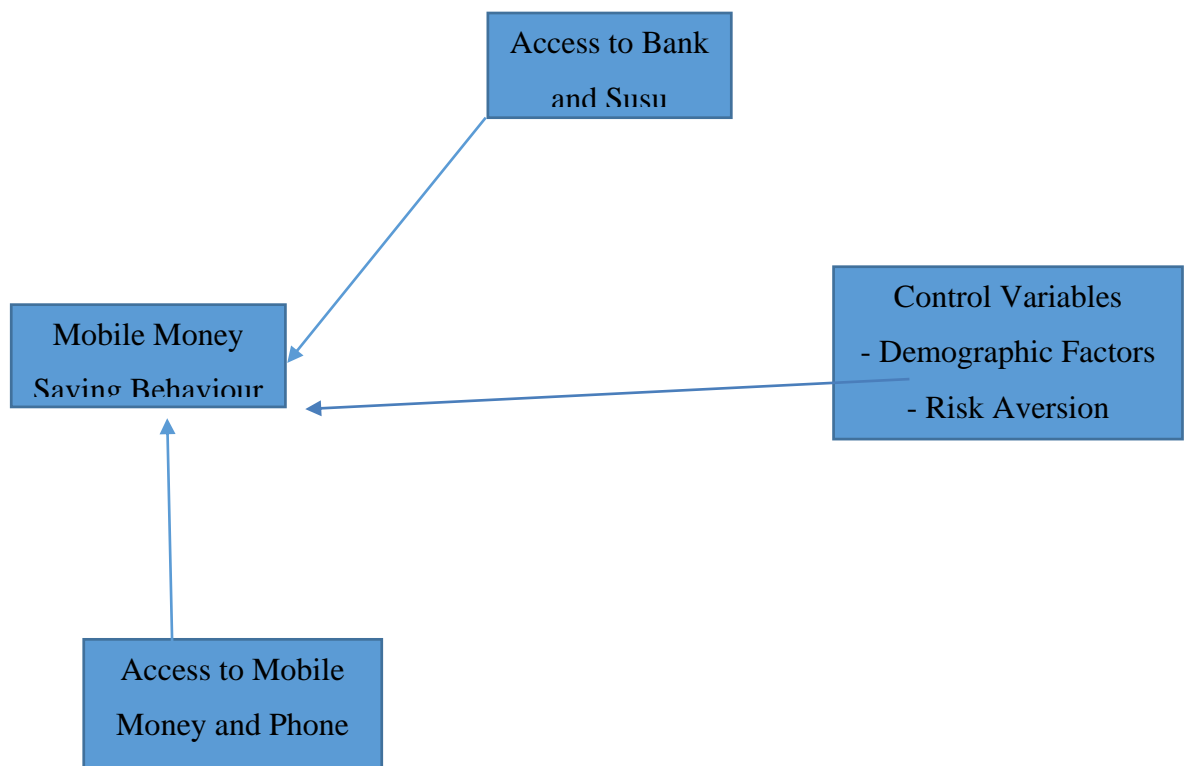
To determine the appropriate sample size, we used “Survey System”. With a confidence interval of 5% and confidence level of 95%, we obtained a sample size of 195 participants. We distributed the questionnaire to 400 participants. 253 of them (63% response rate) responded and we used them to do the analysis: 67 online (e-mail and WhatsApp) and 186 by enumerators. 100% of the questionnaire administered by our enumerators were included in the analysis, but five of the responses received through e-mail and WhatsApp was incomplete and therefore, we excluded them from the analysis. We designed the survey questions by considering the sensitivity of the participants. Some participants may not be willing to disclose their age and income levels for personal reasons, including but not limited to the fear of the tax authorities. Thus, we arranged the questions in such a way that ‘age’ was the last item and income levels were grouped, so that respondents could give a range without disclosing the amount.



## 4.4 Variables

This section gives a detail description of the variables. The model in Figure 6 depicts the relationships between the dependent, independent and the control variables. We measured the dependent variable using the amount saved. This variable is directly influenced by two independent and a number of control variables.

Figure 6. Graphical Representation of the Conceptual Model



### 4.4.1 Independent Variables

The key independent variables are access to mobile money and mobile phone on the one hand and access to formal and informal financial services on the other hand. The latter is represented by bank and susu (a form of traditional savings. For details, see Table 4 ). However, there are different ways to measure them. For instance, access to mobile money may be measured by the distance from the individual's home to the

nearest agent. We did not use this measure since participants gave conflicting distances during the FGD stage. The second measure is to ask participants if they have access to MM or if they used MM. We used this measure since it allows no room for conflicting results. A similar measure was employed for access to formal financial services. It gives more accurate and reliable information to ask the respondents if they have a bank account rather than asking them to estimate distance to the nearest bank or ATM. In the same context, we asked respondents if they used Susu or other forms of informal traditional savings. To measure phone access, ownership of a phone by the individual himself/herself or by a close relative in the same household was used.

#### **4.4.2 Control Variables**

As Figure 6 shows, we used some control variables that may impact the savings behavior of MM users directly or indirectly. The first line of these variables fell on demographic category covering variables such as age, age squared, monthly income, previous earnings, as well as other variables including concurrent use of both MM and bank together or mobile money and susu together. Another important control variable is risk aversion. We measured it by fear of fraud and perception of technical deficiency of mobile money platform. Table 4 describes the variables used in the regression analysis. It also includes justification and expected sign according to the previous literature.

Table 4. Definition and Expected Signs of Variables

<b>Variable Name</b>	<b>Definitions and Justification</b>	<b>Expected Sign</b>
Mobile Money access (MMaccess)	The individual usage of MM either on their own phone or through street agents using codes. Here the focus is on basic MM financial services including payment of bills, transfers, remittance, payment of school fees etc.	Positive
Phoneaccess	This refers to the individuals having their own mobile devices by which they can benefit from financial services provided by network operators	Positive
Age	In line with the Life-Cycle-Hypothesis (LCH), individuals save more as they advance towards retirement hoping to dissave after retirement.	Positive
Age Squared	In line with the LCH, age and age squared are included. According to the LCH, saving increases as age increases up to a point nearing retirement and then decreases as age increases. By including age squared, we account for this quadratic relationship.	Negative
Marriage	Two forms of marital status were considered: married and single. People who are married prefer to make allowances for uncertainties they may face. Marriage also pools the earnings of two persons thereby increasing the probability to save.	Positive
Risk Aversion (fearoffraud)	Some individuals are more risk averted than others. We included this variable because of the recent development in the Ghana banking industry. Those who fear to loose their money to fraudsters or bankruptcy are more likely to keep it in other forms.	Negative

Susu	Susu is an age-old informal means of savings among Ghanaians. This practice involves rotating savings between a small group of people whereby members contribute for each other in rotational basis. It can be weekly or monthly. This method is predominant among trusted circles. A person who uses it and has a bank account may reduce his dependence on MM. Another form of this involves making periodic deposits with an individual or institution other than a bank.	Negative
Bank and MM together	This variable refers to those individuals who have bank account alongside mobile money account. They are most likely to save in the bank and not on MM.	Negative
Monthly Income	If the individual has regular monthly income it increases his/her ability to save	Positive
Previous Earnings	This variable indicates whether the individual previously had a source of income before they started using MM. This affects the life style of the individual and may either increase their propensity to consume or save	Positive or Negative
Mmsaving	This variable has two forms: The frequency of savings on MM platform and the amount saved	Dependent Variable

#### 4.5 Cronbach's Alpha

After designing the survey, we conducted a pilot study for about 20 participants to test its reliability. A Cronbach's Alpha of 0.71 showed that the study was within the acceptable reliability threshold. After administering the survey, to determine the degree to which the items measure consistently the intended behaviour, we again calculated Cronbach's Alpha. The results showed a score of 0.741 with standardized Alpha being 0.717, which is within the acceptable reliability threshold.

Table 5: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.741	.717	35

#### 4.6 Theoretical Framework

This study, like many other studies on household and individual savings, is based on the Life-Cycle-Hypothesis (Modigliani and Ando, 1957). This is a consumption theory based on the belief that people make rational spending choices. The rational choices are made in such a way to spread one's income over a life time. In other words, limited only by the resources available over their lives, people make rational choices as to how much to spend at each age. Following Shem et al. (2017), the empirical model is structured as follows:

$$s_i = \alpha_i + \beta x_i + \gamma z_i + \varepsilon_i \dots \dots \dots (1)$$

where, the savings behavior of MM user (i) is represented by  $s_i$  as a proxy,  $\alpha$  represents a constant,  $z_i$  is the use of MM by individual (i),  $\varepsilon_i$  is the error term which represents the unexplained variance. It represents the savings behavior of MM user not captured in the model above. It can be termed as the statistical disturbance variable.  $x_i$  represents other control variables like education level, age, income level, marital status, and personal disposition to risk. The model can be broaden to include the following control variables such as risk aversion, prior income, use of susu before, access to formal financial services, monthly income, age and marriage. The model is then modified as follows:

$$s_i = \alpha_i + \beta_2 PH_{access} + \gamma MM_{access} + \varepsilon_i \dots\dots\dots (2)$$

It is imperative to acknowledge the role of the past disposable income in current savings of the individual. Directly or indirectly, past earnings capability has an impact on wealth as well as cultivated life style of a person. Savings and consumption are manifestations of life styles. Thus, it may be misleading to examine the impact of MM on the savings behavior of an individual without accounting for his previous earnings. Accordingly, Equation (2) is modified as follows:

$$s_i = \alpha_i + \beta_1 Y + \beta_2 PH_{access} + \gamma MM_{access} + \varepsilon_i \dots\dots\dots (3)$$

where,  $s_i$  is the the savings behavior of the individual,  $i$ : in this case, the amount saved and frequency of saving on MM. Both variables may be used for OLS estimation following Georgina and Eric (2018).  $Y$  is the previous earnings capability of the individual user  $i$  and all other terms remained as defined above.

The main objective of the study is to assess the effect of MM on the saving behavior of users. To meet that goal, it is necessary to investigate whether there exists a causal relationship between MM usage and savings behavior of users. Given that the dependent variable (amount saved) is continuous, the appropriate method will be to use OLS after examining for its conditions. Our case does not permit the use of logit employed by other researchers. Logit is the most appropriate method when the dependent variable is binary. Since the target population was only MM users, we focused on two key independent variables: amount saved and frequency of saving.

#### 4.7 OLS

The study employs the OLS method to analyze the data. The use of OLS method of estimation requires that the data meet certain conditions which will lead to a consistent,

efficient and unbiased estimation of results. The following are some of the conditions of OLS method. The relationship needs to be linear in parameters, and the conditional mean of the error term must be zero. A zero conditional mean indicates that there is no relationship between the error term and the independent variables. In other words, the error term does not depend on the independent variable. Two other important conditions that the data must meet are the absence of multi-collinearity and heteroscedasticity. No multi-collinearity means there is no perfect collinearity between the independent variables, while absence of heteroscedasticity implies the presence of homoscedasticity. In other words, the conditional variance of the error term is constant. Last but not the least, the error terms should be normally distributed.

## CHAPTER 5

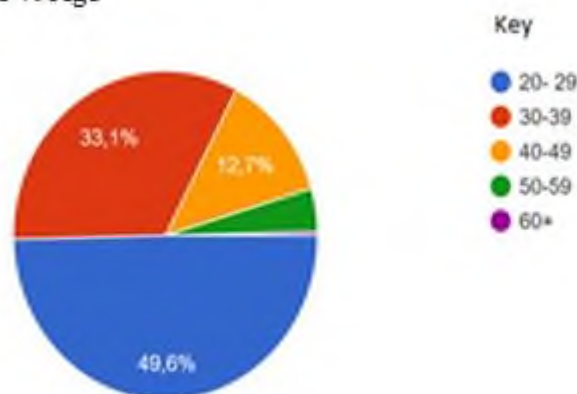
### EMPIRICAL FINDINGS

In this Chapter, we first present the summary of descriptive statistics, focusing mainly on the demographic characteristics of the respondents. Then, we give the results of the preliminary analysis and OLS estimations for the impact of MM on savings behaviour in Ghana. After, we give the OLS results for mobile money access and Phoneaccess on savings behaviour. We investigate the effect of the each explanatory variable (MMaccess and phoneaccess) separately before controlling for other variables.

#### 5.1 Descriptive Statistics

Figures 7 to 9 present the descriptive statistics about the demographic characteristics of the respondents.

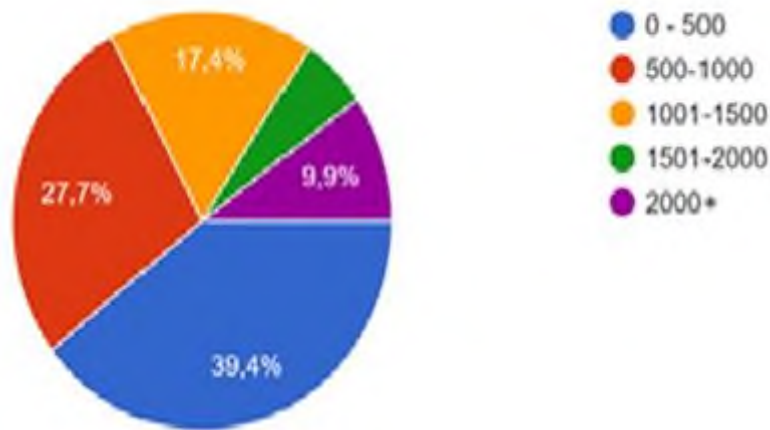
Figure 7. Age



The age range of the respondents changes from 20 to 60+ above. 49.6% of the respondents belong to 20-30 age category. This is followed by 33% within 30-39 age category while 12.7% fell in the 40-49 age category. The majority of the respondents are single (58.6%).

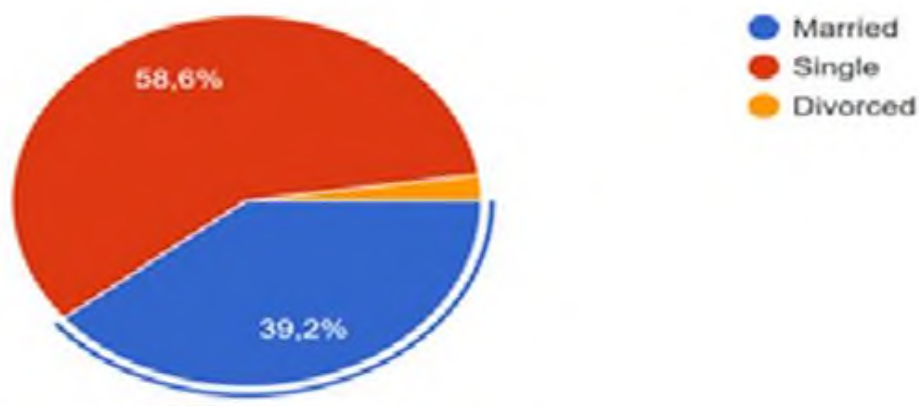


Figure 8. Monthly Income



The monthly income variable is very important since people who have regular sources of income can shape their life styles better either by supporting their savings or consumption. The majority of the respondents (39%) have regular source of monthly income below GHS 500. 27.7% of the respondents earn monthly income of GHS 500-1,000. Those earning above GHS1,000 but less GHS1,500 have share of 17.4%. Only about 10% of the respondents earn above this threshold. Figure 8 shows the distribution of the respondents by income level.

Figure 9. Marital Status



In the literature of mobile phones and mobile money, marital status is a stylized fact. Therefore, it is incumbent to explore it in order to make meaningful treatments. We observe that 39% of the respondents are married and 58.6% are single (Figure 9).

## 5.2 OLS Preliminary Analysis

We usually consider the OLS as the best linear unbiased estimator among linear estimators (Gauss-Markov theorem) since it has the smallest variance of the linear estimators that could possibly be used. We analyzed the data to ensure whether the conditions of OLS are satisfied or not. By using this estimator, we want to make sure that the variances of the residuals are not due to any of the exogenous variables. In other words, there should be no correlation between the error term and independent variables. Another important assumption is that the residuals are normally distributed. We conducted the Jarque-Bera normality test to check the normality of the error terms. In conducting the Jarque-Bera test, the null hypothesis is that the residuals are normally distributed. We fail to reject the null hypothesis of normality of the residuals. To confirm that the error terms are really normally distributed, we employed a graphical method by generating and plotting the residuals. Though the results skewed slightly to the right, it is statistically enough to confirm normality.

We also used the Breusch-Pagan test to check for heteroscedasticity. The null hypothesis of Breusch-Pagan test is that there is homoscedasticity.

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Ho: Constant variance

Variables: MMaccess phoneaccess bankandMMtogether susuandMMtogether  
Marriage

Risk aversion age income before age squared monthly income remittance.

$$\text{chi2}(11) = 27.62$$

$$\text{Prob} > \text{chi2} = 0.0037$$

The test results show a significant chi-square value at 1%. Thus, the null hypothesis of the presence of homoscedasticity is rejected. Therefore, we assumed the existence of heteroscedasticity. Stock and Watson (2015) advocates, as a rule-of-thumb, to always assume the presence of heteroscedasticity. There are two ways to solve this problem: one way is to use the weighted least squares and the other way is to use heteroscedastic robust standards. The latter is adopted because it gives equally accurate estimations. In addition, we also conducted tests to ensure that no multi-collinearity exist. Specifically, we used correlation matrix and variance inflation factor (VIF).

Table 6. Variance Inflation Factor

	VIF	1/VIF
Age	23.656	.042
Agesq	23.15	.043
Marriage	1.399	.715
Phoneaccess	1.316	.76
Monthlyincome	1.262	.793
Remittance	1.137	.879
SusuandMMtogether	1.127	.887
IncomebeforeMM	1.107	.903
MMaccess	1.09	.918
BankandMMtogether	1.078	.928
Risk aversion	1.042	.96
Mean VIF	5.215	.

None of the values of the correlation matrix exceeds the 0.8 threshold considered by Brooks (2008) to be high. For the values of VIF, the commonly acceptable threshold is 10. From the tests results, one can infer that no explanatory variable has a linear relationship with another independent variable. In other words, we found no multi-collinearity, except for age and age squared variables. Since age and age squared are closely related, there is no problem at all with the results. (See Appendix A for the correlation matrix).

### 5.3 Empirical Results

The OLS is used to assess the effect of MM on the savings behavior of users. To test the hypothesis 1 and 2, we analyzed each independent variable individually by using the saving amount as the dependent variable. There are two importance reasons for doing it; first, it helps us to observe not only the individual impact of each variable, but also the change in coefficient when the next variable is introduced. Second, models with fewer variables are better than those with more variables in terms of degrees of freedom. In the former case, the degree of freedom is higher.

In conducting the analysis, we first examined the individual impact of access to mobile money (MMaccess) on savings behavior. Then, we referred to access to mobile phone and control variables. Tables 7.1 to 7.4 show results for “MMaccess”, “phoneaccess”, “age” and “marriage” respectively. When we put all the variables together, we obtain the results presented in Table 7.5.

Table 7.1. OLS Regression (MMaccess)

MMsaving2	Coef.	St.Err	t-value	p-value	Sig.
MMaccess	0.249	0.074	3.37	0.001	***
_cons	2.364	0.235	10.05	0.000	***
Mean dependent var	3.040	SD dependent var		1.411	
R-squared	0.056	Number of obs		248.000	
F-test	11.381	Prob > F		0.001	
Akaike crit. (AIC)	863.191	Bayesian crit. (BIC)		870.217	

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

Table 7.1 depicts that, with a coefficient of 0.249, mobile money access significantly explains savings behavior since the p-value is lower than 0.05 significance level. By the introduction of access to phone (phoneaccess) to the model, a higher coefficient of 0.419 with a p-value lower than 0.01 level of significance is recorded (Table 7.2). One

should note that when ‘phone access’ variable is introduced, the coefficient of MMaccess is reduced to 0.176 accompanied with slight change in significance. This observation is critical in detecting the users’ propensity to save. It gives an indication that the relationship between saving behavior and (MMaccess) is mediated by “phoneaccess”(see Table 8a and 8b). Having a mobile phone increases the likelihood of a person using MM. This, in turn, increases their propensity to save by 0.42 compared with that of 0.18 for those who have access to only MM.

Next, we investigated the effects of age and age squared on both the dependent variable and the explanatory powers of “MMaccess” and “phoneaccess”.

Table 7.2 OLS Regression (Phoneaccess)

MMsaving2	Coef.	St.Err	t-value	p-value	Sig.
MMaccess	0.176	0.069	2.55	0.011	**
Phoneaccess	0.419	0.066	6.32	0.000	***
_cons	1.068	0.257	4.15	0.000	***
Mean dependent var	3.040	SD dependent var	1.411		
R-squared	0.205	Number of obs	248.000		
F-test	32.152	Prob > F	0.000		
Akaike crit. (AIC)	822.694	Bayesian crit. (BIC)	833.234		

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

Table 7.3. OLS Regression (Age and Age-Squared)

MMSaving2	Coef.	St.Err	t-value	p-value	Sig.
MMaccess	0.181	0.070	2.59	0.010	**
Phoneaccess	0.419	0.067	6.25	0.000	***
Age	0.117	0.102	1.15	0.250	
Age_squared	-0.480	0.451	-1.07	0.288	
_cons	1.451	0.467	3.11	0.002	***
Mean dependent var	3.040	SD dependent var	1.411		
R-squared	0.209	Number of obs	248.000		
F-test	16.100	Prob > F	0.000		
Akaike crit. (AIC)	825.347	Bayesian crit. (BIC)	842.914		

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

The results reveal a very interesting pattern (Table 7.3). Age and age squared do not decrease the coefficients of MMaccess and phoneaccess unlike the case we observed above. However, both age and age squared do not have significant impact on savings.

We also replaced age and age squared with marriage. The results show a staggering positive impact at 1% significance level (Table 7.4). Here, one can argue that whether or not an individual is married influences his/her savings. A possible reason may be that married couples tend to save more for unexpected events MM provides them this opportunity with its quick access and convenience. The findings confirm that of Shem et al. (2017).

Table 7.4. OLS Regression (Marital Status)

MMsaving2	Coef.	St.Err	t-value	p-value	Sig.
MMaccess	0.151	0.061	2.50	0.013	**
Phoneaccess	0.233	0.069	3.38	0.001	***
Marital status	0.494	0.074	6.68	0.000	***
_cons	-0.167	0.253	-0.66	0.508	
Mean dependent var	3.040	SD dependent var	1.411		
R-squared	0.317	Number of obs	248.000		
F-test	51.165	Prob > F	0.000		
Akaike crit. (AIC)	786.968	Bayesian crit. (BIC)	801.021		

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

After we examined the individual impacts, we run all the dependent and control variables together. The results of OLS estimates are shown in Table 7.5. MMaccess positively influences the savings behavior at 1% significance level. This supports the first hypothesis (H1) which asserts that access to mobile money is positively related to savings behavior. The coefficient of MMaccess is an indication that access to MM increases an individual's likelihood of saving on the platform by 20.7%. This result contrasts with the findings of Georgina and Eric (2018) who argued that access to and use of mobile money tend to increase spending behavior, rather indiscriminately, at least in the case of Ghanaian students. Our findings, however, confirm the assertions of Shem et al. (2017) that access to and use of mobile money have positive and significant impact on savings. Our results are also consistent with the findings of Aker and Wilson (2012) who conducted a preliminary action-research style in Northern Ghana to investigate financial inclusion and found that majority of the people were willing to save on the mobile money platform.

Table 7.5. OLS Estimations (All Variables Combined)

MMsaving2	Coef.	St.Err	t-value	p-value	Sig.
MMaccess	0.207	0.058	3.57	0.000	***
Phoneaccess	0.218	0.067	3.23	0.001	***
bankandMMtogether	-0.188	0.062	-3.04	0.003	***
susuandMMtogether	-0.030	0.072	-0.41	0.683	
Remittance	0.286	0.069	4.14	0.000	***
Marital status	0.416	0.072	5.79	0.000	***
Risk_aversion	-0.075	0.069	-1.08	0.281	
Age Squared	-0.313	0.391	-0.80	0.424	
Age	0.092	0.084	1.10	0.274	
incomebeforeMM	-0.087	0.062	-1.40	0.162	
Montlyincome	-0.002	0.180	-0.01	0.991	
_cons	0.619	0.513	1.21	0.229	
Mean dependent var	3.040	SD dependent var		1.411	
R-squared	0.411	Number of obs		248.000	
F-test	24.180	Prob > F		0.000	
Akaike (AIC)	crit. 768.050	Bayesian (BIC)	crit. 813.725		

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

Access to mobile phone also significantly influences the savings behavior. Its coefficient (0.218) is positive and highly significant at 1% level of providing a solid support for the hypothesis two (H2). The implication here is that having access to a mobile phone, a key device required for mobile money, increases the possibility of savings by almost 22%. Although ownership of mobile phone is not a necessary requirement to execute MMtransactions, particularly those transactions related to sending and receiving money, the results show its significance on savings.



The control variables, however, reveal mix results. In line with the Life-Cycle Hypothesis, age and age squared have the expected signs. Age is positively related to savings, while age squared has negative relationship though not statistically significant. As we mentioned before, according to the LCH, as the age of the individuals increases, their propensity to save increases in preparation for their retirement, getting close to retirement, savings dwindle and eventually dissaving occurs after retirement. Relating this process to savings on the MM platform, the findings are consistent with the LCH though we did not find age and age squared to be statistically significant. These facts indicate that there is no relationship between age and mobile money saving behavior and suggest that people from all ages use and save on mobile perhaps due to its easy to use and convenience of quick access features.

Another variable is marital status. Previous studies have shown that marital status is related to both spending and savings behavior of MM users (Georgina and Eric, 2018). We also found a positive correlation between marital status and savings. Getting married as opposed to be unmarried improves the ability to save by 42%. An explanation may be that married people usually save for their family needs and future prospect and MM provides that opportunity.

Risk aversion measured by the fear of fraud and perception of security of the mobile network operators has negative relationship with savings. Though its coefficient of -0.075 is not statistically significant, it seems that fear of fraud could possibly prevent people from saving through mobile money platform. Public perception of security for MM may be a deciding factor. If this perception is negative, it will prevent people from saving. This is particularly true if people fear of losing their funds saved on MM. It is reasonably the case since Ghana has recently witnessed collapse of some banks where even government bailout was embezzled by board members of these banks leaving customers with nothing. During the FGD stage of this study, some people also reported to have been contacted by fraudulent people. Such activities may have the potential to create negative perception of security and consequently may deter saving. We also found a negative relationship for monthly income. Similar to risk aversion,

the coefficient of -0.002 is not significant. It indicates that people who have regular sources of monthly income do not pretend to save on MM. This may be true especially when they receive their salaries through banks and prefer keeping their money in a bank account.

#### 5.4 Mediating Role of Access to Mobile Phone

Sometimes the relationship between the dependent and independent variables may be affected by a mediating variable. A mediating variable explains the reason why there exists a relation between two variables in the first place. It can be a mechanism through which an explanatory variable can affect changes on the dependent variable. When the effect of the mediator is fully accounted for, the relationship between the two variables may reduce significantly. In our case, the relationship between MM and savings behavior seems to be mediated by phone access. In other words, part of the relationship is due to phone ownership. This phenomenon gives rise to direct and indirect effects which are examined in this section. This is illustrated in Table 8a and 8b. Table 8a shows the indirect effect which is significant at 1% level while the direct effect is displayed in Table 8b.

Table 8a: Indirect Effects

		OIM <sup>1</sup>				
	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]	
Structural						
MMsaving2						
Phoneaccess	0	(no path)				
MMaccess	0.072096	0.027806	2.59	0.01	0.017598	0.126594

Table 8b: Direct Effects

---

		OIM <sup>2</sup>				
	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
Structural						
MMsaving2						
phoneaccess	0.419186	0.061568	6.81	0	0.298514	0.539857
MMaccess	0.176405	0.060403	2.92	0.003	0.058017	0.294794
phoneaccess						
MMaccess	0.17199	0.061334	2.8	0.005	0.051777	0.292202

Though the coefficient attributable to phone ownership is small relative to that of MM access, it is still positive and highly significant. This result underscores the importance of phone penetration not only in Ghana, but in Africa as a whole. It also gives support to the argument that personal mobile phone ownership may significantly accelerate financial access.

## 5.5 Robustness Check Results

For robustness check, we estimated OLS by using frequency of saving as a dependent variable. The results in Table 9 do not significantly differ from those that were recorded above, though there are slight differences. Age, age squared and “susuandMMtogether” are still statistically not significant.

---

<sup>1</sup> Observed Information Matrix

Table 9. Robustness Check Results

Savingfreq	Coef.	St.Err	t-value	p-value	Sig.
MMaccess	0.111	0.046	2.44	0.015	**
Phoneaccess	0.125	0.054	2.31	0.022	**
bankandMMtogether	-0.327	0.052	-6.32	0.000	***
susuandMMtogether	0.014	0.049	0.29	0.771	
Remittance	0.121	0.050	2.40	0.017	**
Marital status	0.103	0.065	1.58	0.116	
Risk_aversion	-0.081	0.048	-1.67	0.097	*
Age	0.143	0.341	0.42	0.675	
incomebeforeMM	-0.114	0.049	-2.30	0.022	**
Monthly_income	0.396	0.059	6.72	0.000	***
Age_squared	-0.062	0.077	-0.81	0.420	
_cons	1.897	0.470	4.04	0.000	***
Mean dependent var	2.823	SD dependent var	1.276		
R-squared	0.510	Number of obs	248.000		
F-test	20.416	Prob > F	0.000		
Akaike crit. (AIC)	672.582	Bayesian crit. (BIC)	718.257		

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

“MMaccess” and “phoneaccess” are still significant. It implies that while these variables significantly affect the saving amount, they may also influence the frequency of usage.

“BankandMMtogether” represents people who reported having a bank account and, at the same time, using MM. Its coefficient is negative and significant at p<0.01. This confirms our early assertion that people who have access to bank accounts may not withdraw their money from banks to save it on MM platform. This fact probably accounts for the negative relationship

Progressively, the total variance explained (R-squared) rises with the addition of variables. It eventually reaches 0.510. Although this value is acceptable, it is still important to check the model to avoid omitted variable bias (OVB) which occurs when a relevant variable having explanatory power is omitted in the model. This usually happens in OLS estimations if the regressor is highly correlated with a variable, which is omitted from the model. So finally, we conducted the OVB test to examine the model for omission of any relevant variable.

Ramsey RESET test using powers of the fitted values of MMsaving2

Ho: model has no omitted variables

$$F(3, 233) = 0.51$$

$$\text{Prob} > F = 0.6731$$

Prob value is not significant. The result shows that the model has no omitted variables. This test is important because when a determinant of the dependent variable is left out, the effect is captured in the error term. This leads to an estimation bias which means that the mean of the sampling distribution of the OLS estimators becomes unequal to the population mean.

## **CHAPTER 6**

### **CONCLUSION**

The role that mobile money plays in facilitating and deepening financial inclusion is critically important especially in developing countries where the lack of access to formal financial institutions often creates a problem thereby derailing governments' efforts to attain economic growth. This exclusion often leads people in developing countries with no option but to live entirely on cash.

Given the widespread penetration of mobile phones in Africa and more recently, the public enthusiasm towards MM in the developing countries, this study examined the impact of MM on the savings behavior of Ghanaian users. The key proposition of the study is that MM as a tool of financial innovation in the FinTech era will accentuate the effort of policy makers in deepening financial inclusion if it positively influences savings culture.

The study is conducted in the light of the Life-Cycle-Hypothesis (LCH). LCH postulates that the main motivation to save stems from the need to smoothen one's consumption over time despite changes in income. In other words, the individuals allocate their resources over a life time. Since individuals earn more in early years, adjustment is then made in the form of savings to cater for later years, retirement. In this sense, age is a critical factor in making any meaningful interpretation of savings behavior of mobile money users.

In this study, we presented an overview of the historical development of MM, its economic as well as social uses and challenges that could possibly pose threats to its uses. We also looked at the major service providers in Ghana as well as the regulatory framework within which they operate. We gathered data for the study through a survey using the right coverage random sampling method. The sample consists of users from Accra, Tamale and its surroundings. We circulated the questionnaire for the study through e-mail, WhatsApp and trained enumerators. 253 respondents participated in

the study. The majority of the respondents are within the age category of 20-30. This age group, when combined with the category of 30-39 age range, represents the most productive labour force in the country consisting more than 80% of the respondents. It is important since these age groups tend to save more than the other age groups. With regards to income level and earning ability, 90% of the respondents earn between GHS 0-2,000.

We tested the hypotheses of the study using OLS estimations. The results show that the access to and use of MM influence significantly the amount of savings by individuals. The results is in line with Shem et al.(2017). However, it contradicts that of the findings of Ggombe and Tomoya (2015), who argued that the users of this financial innovation tend to record an increase in per capita spending. A similar opinion is held by Georgina and Eric (2018).

Furthermore, we found a negative but significant relationship between MM usage and access to a bank account. The implications of this is far more revealing. A supporting explanation may be that MM agents locate in areas where there are no banks. Since MM mostly triumphs in rural communities where banks do not reach, it can be argued that those who save on MM do not have bank accounts. Another important finding is that the Susu and MM have a negative relationship between them demonstrating the effects of other financial services providers on MM usage. This argument agrees with the assertion of Georgina and Eric (2018) that banking products may be used jointly with MM, but the two are not necessarily complementary.

Other variables that show significant impact on savings are remittance and marital status. MM is a cash transfer dominated platform. Thus, people send and receive remittances through it and are more likely to save on it. Previous literature suggested that using MM does not only increase the probability of receiving remittances but also the frequency of it (Ggombe and Tomoya , 2015). In other words, the more people receive remittances through MM, the more likely they save. Marital status has the highest coefficient at 1% significance level. It shows its importance in influencing the savings behavior of individuals. A plausible explanation may be that married

individuals have a growing need to smoothen their consumption. Our findings are consistent with the previous literature (Georgina and Eric, 2018; Shem et al., 2017)

Individuals also differ in their propensity to save and personal disposition to risk. In the most fundamental sense, the question of how to decouple the effect of MM on the savings behavior from the effect of individual differences is relevant. Such a question, agreeably, is important since personal disposition influences people's saving behaviours. This could be due to a number of reasons.

First, a risk lover will have a natural proclivity to save on MM. In order to account for this proclivity, the study included risk aversion variable which turns out to be negatively associated with savings on MM platform. In terms of policies, this result has profound implications. On the one hand, MNOs need to take steps to ensure security of the highest degree on the platform. On the other hand, regulators need to put some measures into place to assure security for the funds owners. These may increase the motivation and desirability of savings on the MM platform. Second, some people generally have a high propensity to save than others. Savings is a financial behavior which is highly influenced by the life style cultivated over time. The life style influences and is influenced by one's disposable income and accumulated wealth. The study finds that monthly income and previous earnings do not have significant effect on the amount saved. One reason is that savings on MM is constant, not being affected by one's income level.

The findings regarding age and age squared basically are in line with the theoretical expectations. During the most productive periods in an individual's life, most people earn and save their income hoping to smoothen their life time consumption. Hence, there is a positive relationship between age and savings behavior. This is particularly true in the case of rural Ghana where many people neither have mandatory savings nor have any social security. In the later stages of their lives, people tend to rely on savings as earnings dwindle.



Both access to and use of MM, and phone have positive and significant relationship with frequency of saving. Risk aversion significantly affects the frequency of savings. This result calls for further discussion on the issue of safety and security of funds if policy makers want to increase the motivation of people to save regularly using MM. We also found income level to have significant influence on the frequency of saving. Thus, people's income level only influences their frequency of saving and certainly not the amount saved. Probably, this is due to MM transactions largely involving in small amounts.

Although this study throws light to the importance of MM usage on savings behavior, it does not cover every aspect of it. The future research may focus on exploring the impact of cultural and religious factors on the savings behavior of MM users in Ghana and other African countries. Another interesting topic may be to search for the effect of different regulatory regimes on the development and usage of MM in African region. Last, the future studies may investigate the motivating factors in attracting more people to save on the MM platform.

## REFERENCES

- Aker, J. C., & Mbiti, I. M. (2010). Mobile Phones and Economic Development in Africa. *Journal of Economic Perspectives*, 24(3), 207–232. <https://doi.org/10.2139/ssrn.1693963>
- Aker, J. C. & Wilson, K. (2012) Can Mobile Money Be Used to Promote Savings? Evidence from Northern Ghana. *SWIFT Institute Working Paper No. 2012-003*. Available at SSRN: <https://ssrn.com/abstract=2217554> or <http://dx.doi.org/10.2139/ssrn.2217554>
- Anoruo, E., & Ahmad, Y. (2001). Causal Relationship between Domestic Savings and Economic Growth: Evidence from Seven African Countries. *African Development Review*, 238–250.
- Bank of Ghana. (2017). Impact of Mobile Money on the Payment System in Ghana: An Econometric Analysis. Retrieved from [https://www.bog.gov.gh/privatecontent/Public\\_Notices/Impact of Mobile Money on the Payment Systems in Ghana.pdf](https://www.bog.gov.gh/privatecontent/Public_Notices/Impact_of_Mobile_Money_on_the_Payment_Systems_in_Ghana.pdf)
- Bankole, F. O., & Bankole, O. O. (2017). The Effects of Cultural Dimension on ICT Innovation: Empirical Analysis of Mobile Phone Services. *Telematics and Informatics*, 34(2), 490–505. <https://doi.org/10.1016/j.tele.2016.08.004>
- Baro, E. E., & Endouware, B. C. (2013). The Effects of Mobile Phone on the Socio-economic Life of the Rural Dwellers in the Niger Delta Region of Nigeria. *Information Technology for Development*, 19(3), 249–263. <https://doi.org/10.1080/02681102.2012.755895>
- Bold, C., Porteous, D. & Rotman, S. (2012). Social Cash Transfers and Financial Inclusion: Evidence from Four countries. Consultative Group for Assisting the Poor (CGAP), February, 1-20.
- Brooks, C. (2008). *Introductory Econometrics for Finance*, Cambridge Univ. Press Cambridge, New York.
- Butler, R. (2005). Cell Phones May Help “Save” Africa. Mongabay.com. Retrieved from [http://news.mongabay.com/2005/0712-rhett\\_butler.html](http://news.mongabay.com/2005/0712-rhett_butler.html).
- CGAP. (2009). Window on the Unbanked: Mobile Money in the Philippines. *CGAP*, (December 2009), 1–4.
- Clark, F. (1975), "Bank Credit Cards: Attitudes and Decisions of Selected Retail Merchants in Arkansas and Missouri," Unpublished dissertation, University of Arkansas, Department of Business Administration, Fayetteville, AR 72701.
- Dahlberg, T., Guo, J., & Ondrus, J. (2015). A Critical Review of Mobile Payment Research. *Electronic Commerce Research and Applications*, 14(5), 265–284. <https://doi.org/10.1016/j.elerap.2015.07.006>

- Dahlberg, T. & Öörni, A. (2007). Understanding Changes in Consumer Payment Habits - Do Mobile Payment Attract Consumers? *Helsinki Mobility Roundtable*, 6, 1–10. Retrieved from <http://sprouts.aisnet.org/6-36>
- Davis, F. (1986). A Technology Acceptance Model for Empirically Resting New End-User Information Systems. Unpublished doctoral dissertation, Massachusetts Institute of Technology, Boston, MA.
- Demirgüç, -Kunt, A. & Klapper, L., (2012). Measuring Financial Inclusion: TheGlobalFindex Database Policy Research Working Paper 6025. The World Bank, Washington, DC.
- Demombynes, G.,& Thegeya, A. (2012). Kenya's Mobile Revolution and the Promise of Mobile Savings. *World Bank Policy Research Working Paper No. 12/5988*, 5988(1), 32. <https://doi.org/doi:10.1596/1813-9450-5988>
- Dias, D., & McKee, K. (2010). Protecting Branchless Banking Consumers: Policy Objectives and Regulatory Options. *Focus Note*, 64(64), 20.
- Diniz, E., Porto de Albuquerque, J., & Cernev, A. (2011). Mobile Money and Payment: A Literature Review Based on Academic and Practitioner - Oriented Publications (2001-2011). *SSRN*, (December). <https://doi.org/10.2139/ssrn.2924669>
- Donner, J. (2006). The Use of Mobile Phones be Micro-Entrepreneurs in Kigali Rwanda. *The Massachusetts Institute of Technology Information Technologies and International Development*, Vol. 3, No. 2, Winter 2006, 3–19
- Elijah, O. & Ogunlade, I. (2006). Analysis of the Uses of ICT for Gender Empowerment and Sustainable Poverty Alleviation in Nigeria. *International Journal of Education and Development(IJEDICT)*, 2(3), 45-69
- Ehrbeck, T., Pickens, M. & Tarazi, M. (2012). Financially Inclusive Ecosystems: The Roles of Government Today. CGAP, February.1-11.
- Etim, A. (2011). Bottom - Up Business Development: Empowering Low Income Societies through Microfinance and Mobile Technologies. *International Journal of Humanities and Social Science*, 1(13), 1–11. Retrieved from [http://www.ijhssnet.com/journals/Vol\\_1\\_No\\_13\\_Special\\_Issue\\_September\\_2011/1.pdf](http://www.ijhssnet.com/journals/Vol_1_No_13_Special_Issue_September_2011/1.pdf)
- Feinberg, R. A. (1986). Credit Cards as Spending Facilitating Stimuli : A Conditioning Interpretation, *13*(December), 348–356.
- Georgina, C. M., & Eric, O.-A. (2018). Mobile Money Adoption and Spending Behaviour: The Case of Students in Ghana. *International Journal of Social Economics*, 45(1), 29–42. <https://doi.org/http://dx.doi.org/10.1108/MRR-09-2015-0216>
- Ggombe, M. K., & Tomoya, M. (2015). Mobile Money, Remittances, and Household Welfare: Panel Evidence from Rural Uganda. *World Development*, 79, 127–137. <https://doi.org/10.1016/j.worlddev.2015.11.006>

- Gichuki, C. N., & Mulu-Mutuku, M. M. (2018). Determinants of Awareness and Adoption of Mobile Money Technologies: Evidence from Women Micro Entrepreneurs in Kenya. *Women's Studies International Forum*, 67(November 2017), 18–22. <https://doi.org/10.1016/j.wsif.2017.11.013>
- GSMA (2016). The State of Mobile Money in Sub-Saharan Africa. *GSMA Intelligence*.
- GSMA (2017). State of the Industry Report on Mobile Money. *GSMA Intelligence*.
- GSMA (2018a). The Mobile Economy: West Africa 2018. *GSMA Intelligence*, 36. Retrieved from <https://www.gsmaintelligence.com/research/?file=e568fe9e710ec776d82c04e9f6760adb&download>
- GSMA. (2018b). The Mobile Economy. *GSMA Intelligence*, (35), 53. <https://doi.org/10.5121/ijcsit.2015.7409>
- Hahn, H.P. & Kibora, L. (2008). The Domestication of the Mobile Phone: Oral Society and New ICT in BurkinaFaso. *J. Mod. Afr. Stud.* 46 (01), 87–109.
- Huck, L. (1976). Making the Credit Card the Customer, *Banking*, 68 (May), 37, 80, and 83.
- Jack, W., & Suri, T. (2011). Mobile Money: The Economics of M-PESA. *MIT Sloan Management Review*, 1–30. <https://doi.org/10.3386/w16721>
- Jan, L., & Augustina, O. (2018). The (Non-) Emergence of Mobile Money Systems in Sub-Saharan Africa: A Comparative Multilevel Perspective of Kenya and Nigeria. *Technological Forecasting and Social Change*, 131(December 2016), 262–275. <https://doi.org/10.1016/j.techfore.2017.11.010>
- Jenkins, B. (2008). Developing Mobile Money Ecosystems. IFC, World Bank and Harvard Kennedy School of Government. [http://www.hks.harvard.edu/mrcbg/CSRI/publications/report\\_30\\_MOBILEMONEY.pdf](http://www.hks.harvard.edu/mrcbg/CSRI/publications/report_30_MOBILEMONEY.pdf)
- Jumia Annual Mobile Report (2018) retrieved from <http://ghana.gov.gh/index.php/media-center/news/4470-jumia-annual-mobile-report-2018-launched-in-accra>
- Koloba, H. (2018). Access to Credit and Saving Behaviour of Generation Y Students. Are We Educating An Over-Indebted Generation? *International Journal of Economics and Finance Studies*, 10(1), 50–65.
- Lai, P. C. (2006). The Significant of E-business and Knowledge-Based Customer Relationship in the E-market Place Environment. *INTI Journal*, 2(1), 552–559.
- Lai, P. C. (2007). The Chip Technology Management Implication in the Era of Globalization: Malaysian Consumers' Perspective. *Asia Pacific Business Review*, 3(1), 91–96. <https://doi.org/10.1177/097324700700300107>

- Lai, P. C. (2016). Design and Security Impact on Consumers' Intention to Use Single Platform E-payment. *Interdisciplinary Information Sciences*, 22(1), 111–122  
<https://doi.org/10.4036/iis.2016.r.05>
- Lallana, E. (2004). SMS in Business and Government in the Philippines. ICT4D Monograph Series. Available at [unpan1.un.org/intradoc/groups/public/documents/other/unpan024834.pdf](http://unpan1.un.org/intradoc/groups/public/documents/other/unpan024834.pdf).
- Makina, D. (2017). Introduction to the Financial Services in Africa Special Issue. *African Journal of Economic and Management Studies*, 8(1), 2–7.  
<https://doi.org/10.1108/AJEMS-03-2017-149>
- Mbiti, I. M., & Weil, D. N. (2011). Mobile Banking: The Impact Of M-Pesa in Kenya. *National Bureau of Economic Research*, (Working Paper 17129).
- Modigliani, F. & Ando, A. (1957). Tests of the Life Cycle Hypothesis of Savings. *Bull. Oxf. Inst. Econ. Stat.* 19, 99–124.
- Nofie, I. (2018). Is Mobile Payment Still Relevant in the Fintech Era? *Electronic Commerce Research and Applications*, 30(May), 72–82.  
<https://doi.org/10.1016/j.elerap.2018.05.009>
- Nyantakyi, E., B., & Mouhamadou S. (2015). The Banking System in Africa : Main Facts and Challenges. *African Development Bank*, 6(5), 1–16.
- Page, M., Molina, M., Jones, G., & Makarov, D. (2013). The Mobile Economy 2013. GSMA Intelligence, 100. Retrieved from [http://www.atkearney.com/documents/10192/760890/The\\_Mobile\\_Economy\\_2013.pdf](http://www.atkearney.com/documents/10192/760890/The_Mobile_Economy_2013.pdf)
- Porteous, D. (2006). The Enabling Environment of Mobile Banking in Africa. London: Department for International Development (DFID) Retrieved from <http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2012/>
- PwC. (2016). Ghana Banking Survey: How to win in an era of mobile money. 2016 Ghana Banking Survey, (August), 1--87.
- Sabri, M. F. & MacDonald, M. (2010). Saving Behavior and Financial Problems among College Students: The Role of Financial Literacy in Malaysia. *Cross-Cultural Communication*, 6(3), 103–110.
- Sandra, S. L. (2016). Poor People's Money: The Politics of Mobile Money in Mexico and Kenya. *Telecommunications Policy*, 40(10–11), 945–955.  
<https://doi.org/10.1016/j.telpol.2016.03.001>
- Sey, A. (2011). We Use it Different, Different: Making Sense of Trends in Mobile Phone Use in Ghana. *New Media and Society*, 13(3), 375–390.  
<https://doi.org/10.1177/1461444810393907>
- Shem, A. O., & Rösner, H. J. (2003). Savings Institutions That Count for Small and Micro

Enterprises: The Case of Urban Kenya. *African Review of Money Finance and Banking*, (2003), Pp. 23-46, (2003), 23–46.

Shem, O. A., Teresa, O. M., & Maureen, W. (2017). Mobile Financial Services and Financial Inclusion: Is it a Boon for Savings Mobilization? *Review of Development Finance*, 7(1), 29–35. <https://doi.org/10.1016/j.rdf.2017.01.001>

Steve, S. (2017). Towards an Empowerment Framework for Evaluating Mobile Phone Use and Impact in Developing Countries. *Telematics and Informatics*, 34(1), 359–369. <https://doi.org/10.1016/j.tele.2016.06.003>

Stock, J. H. & Watson, M. W. (2015). *Introduction to Econometrics*. Harlow Pearson Education Limited, Boston. Updated Third Edition, Global Edition, 209.

Teppa, F., Dnb, D. N. B., Ziegelmeier, M., & Blanc, J. Le. (2013). Household Saving Behaviour and Credit Constraints in the Euro Area, 1–62.

Weber, R. H. & Darbellay A. (2010). Legal Issues in Mobile Banking. *Journal of Banking Regulation* 11, no 2 (2010): 129 -145.

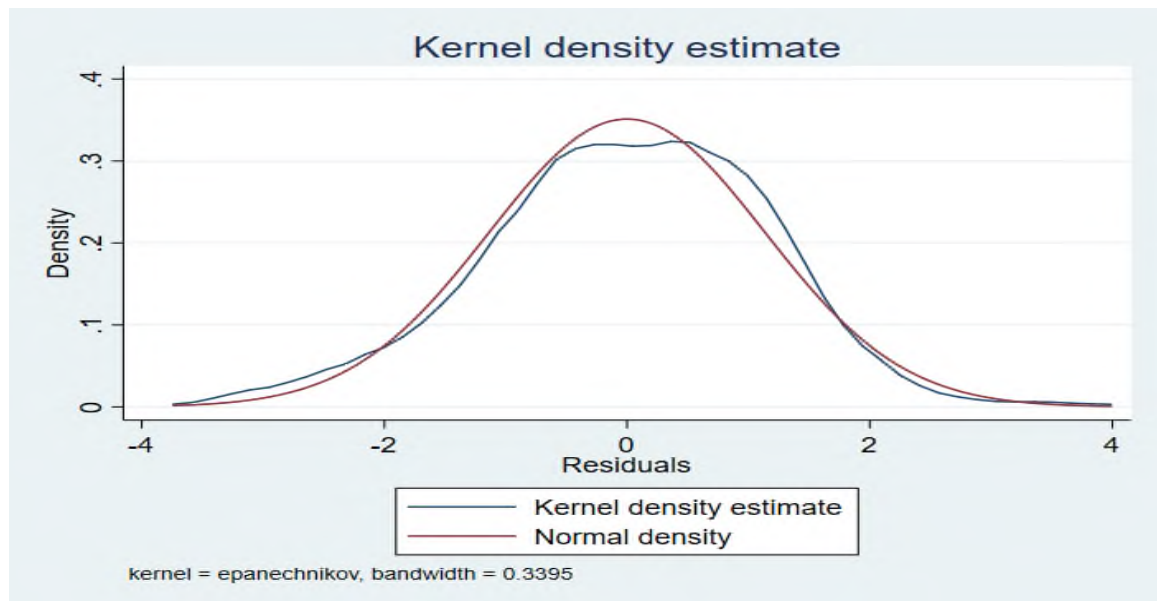
World Bank. (2018). The Little Data Book on Financial Inclusion 2018. *World Bank Group*. <https://doi.org/10.1596/978-1-4648-0552-3>

## APPENDIXES

### Appendix A Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) MMsaving2	1.000											
(2) MMaccess	0.237	1.000										
(3) phoneaccess	0.421	0.175	1.000									
(4)bankandMMtoet~r	-0.130	0.037	-0.031	1.000								
(5)susuandMMtoget~r	0.007	0.047	-0.043	0.059	1.000							
(6) remittance	0.276	-0.105	0.055	0.144	0.179	1.000						
(7) Marital Status	0.503	0.143	0.469	0.053	-0.032	0.182	1.000					
(8) fearfraud	-0.139	0.062	-0.056	0.087	0.063	-0.051	-0.138	1.000				
(9) age	0.021	0.076	-0.011	-0.047	0.154	-0.043	-0.051	0.014	1.000			
(10) agesq	0.031	0.057	-0.011	-0.070	0.152	-0.059	-0.045	0.011	0.977	1.000		
(11)montlyincome	0.018	0.003	-0.009	0.015	0.234	0.107	0.015	0.035	0.382	0.357	1.000	
(12)incomebeforeMM	-0.175	0.027	-0.129	0.148	-0.051	0.006	-0.158	0.016	0.107	0.081	0.143	1.000

## Appendix B Normality Test



## Appendix C

### KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.746
Bartlett's Test of Sphericity	Approx. Chi-Square	2168.024
	Df	630
	Sig.	.000



## Appendix D

### QUESTIONNAIRE ON THE SAVING BEHAVIOUR OF MOBILE MONEY USERS IN GHANA

The purpose of this questionnaire is to gather information on the *"effect of mobile money on the saving behaviour of users in Ghana"* as part of a study for the award of Master of Business Administration at Ibn Haldun University, Istanbul, Turkey. This questionnaire is aimed at users of mobile money in Ghana. I will be most grateful if you could kindly take some time off your busy schedule to respond to the following questions. This is only an academic exercise and you are assured of anonymity and confidentiality.

Kindly, tick [√] the appropriate response in the box or respond to the questions as may be required. We further guarantee that this data will be used only for academic purposes and not for government tax purposes. Thank you.

#### Part I: Demographic Information

This part aims to collect personal information relating to demography. Please tick the appropriate box or write in the space provided if required.

---

<b>Gender:</b>	Male ( )	Female ( )	
<b>Marital Status:</b>	Married ( )	Single ( )	Divorced ( )
<b>Employment Condition</b>	Unemployed ( )	Paid job ( )	Self-employed ( )
<b>Occupation</b>	.....		
<b>Monthly Income</b>	0 - 500 ( ).	500-1000( ).	1001-1500 ( ).
			1501- 2000( ).
<b>Education</b>	None ( )	Basic education ( )	Tertiary ( )
		Secondary ( )	

## Part II: Before using Mobile Money (MM):

In this section, the respondent is required to provide information relating to their economic activities before he/she started using Mobile Money.

1. When did you start using mobile phone?

Less than a year ago ( ). Two years ago ( ). Three years ago ( ). Four years ago ( ). Five years ago ( ). More than five years ( ).

2. When did you start using Mobile Money?

Same time I started using phone ( ) within a year after using a phone ( ) within two years after using phone ( ) within three years after using phone ( ) other. Please specify.....

3. Were you earning income before you started using mobile money?

Yes ( ) No ( )

4. Did you use traditional **informal** means (e.g. Susu) of saving before you started using mobile money?

Yes ( ) No ( )

5. Did you use **formal** means (e.g. Bank) of saving before you started using mobile money?

Yes ( ) No ( )

## Part III: After Mobile Money

In the following table, kindly indicate the extent to which you agree with the statements.

Tick **1 = Strongly Disagree**      **2 = Disagree**      **3 = Neutral**      **4 = Agree**      **5 = Strongly Agree**

Reasons for Mobile Money Uses					
I started using Mobile Money to enable me to save	1	2	3	4	5
I started using Mobile Money to enable me to send or receive money locally	1	2	3	4	5
I started using Mobile Money to enable me to send or receive remittance	1	2	3	4	5
I started using Mobile Money to enable me to make Bill Payment	1	2	3	4	5
I think Mobile Money is easy to use than banks	1	2	3	4	5

<b>Savings on Mobile Money</b>					
I saved using mobile money	1	2	3	4	5
I earned interest on my savings on Mobile Money platform	1	2	3	4	5
If I were to earn interest on Mobile Money savings I would save more using it	1	2	3	4	5
Saving with Mobile Money is more convenient than banks	1	2	3	4	5
I save using Mobile Money because they give me loans	1	2	3	4	5
I save using Mobile money because I feel it is more secured	1	2	3	4	5
<b>Preferences and security</b>					
I still prefer to use formal financial service (e.g. Bank) together with Mobile Money	1	2	3	4	5
I still prefer to use traditional informal financial service together with Mobile Money	1	2	3	4	5
I prefer using Mobile Money for saving rather than using banks	1	2	3	4	5
I prefer using Mobile Money for saving rather than traditional informal means	1	2	3	4	5
I currently save only on Mobile Money platform	1	2	3	4	5
In the future I will save only on Mobile Money platform	1	2	3	4	5
I save using mobile money platform because I can have quick access to my money anytime	1	2	3	4	5
I do not save regularly on Mobile Money because of fraudulent practices	1	2	3	4	5
I find the Mobile Money system secured	1	2	3	4	5
I find the Mobile Money system to be free of technical and operational deficiency	1	2	3	4	5

Using 1=never 2=rarely 3=sometimes 4=often 5=very often please indicate the extent to which the following is applicable to you.

<b>FREQUENCY OF USES</b>					
I use Mobile Money often	1	2	3	4	5
Charges of Mobile Money may affect my frequency of its usage	1	2	3	4	5
I use mobile Money in my everyday life	1	2	3	4	5
I use mobile banking less often than I need to	1	2	3	4	5

Select from among the categories below as best matches the amount you are able to save per annum.

---

Monthly	0 - 1000 ( ).	1001-	2001-3000 (	2001-	2501+ (
Income		2000( ).	).	2500()	).

---

Please indicate which age category correctly describes you.

---

Age	20- 29 ( ).	30-39 ( ).	40-49 ( ).	50-59 ( ).	60+ (
					).

---

Thank you for your time.

Please leave your email address if you are interested in the findings of this research.....

.....

## **CURRICULUM VITAE**

### **Personal Information:**

Name - Surname: Mohammed Andani Hussein

E-mail (1): [andani.hussein@ibnhaldun.edu.tr](mailto:andani.hussein@ibnhaldun.edu.tr)

E-mail (2): [andani2310@gmail.com](mailto:andani2310@gmail.com)

### **Education:**

2009-2013 Bsc. Accounting, University of Education, Kumasi, Ghana.

2017-2019 MA in Management, Ibn Haldun University, Turkey

### **Work Experience:**

2017 – 2019 Research Assistant, Ibn Haldun University, Turkey.