Ashesi University

Developments in Mobile Financial Services and its impact on Financial Inclusion in Ghana

By

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Supervised by Nana Sefaah Kyei-Boadu

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DECLARATION

I hereby declare that this thesis is my original work and that no part of it has been presented for another degree in this university or elsewhere.

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Date: 27th April 2021

I hereby declare that the preparation and presentation of this thesis were supervised in accordance with the guidelines on supervision of theses established by Ashesi University.

Supervisor's Signature

Supervisor's Name: Nana Sefaah Kyei-Boadu

Date: 27th April 2021

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ABSTRACT

Mobile money services have the potential to drive greater financial inclusion and give individuals and businesses access to affordable and timely financial services. In Ghana, mobile money has contributed to the increase in financial inclusion, with fifty-eight (58) per cent of the adult population having access to financial services in 2017, as compared to forty-one (41) per cent in 2014 (Demirguc-Kunt et al., 2018). However, mobile money in Ghana was not as successful in the early stages due to a number of reasons, but when the regulatory guidelines were changed in 2015, the adoption rates of mobile money increased significantly. Thus, this study aimed to investigate if the increase in the adoption of mobile money was as a result of a change in the regulatory guidelines.

Furthermore, the Bank of Ghana mandated mobile money interoperability between mobile money providers and banks in 2018 with the hope of deepening financial inclusion. Thus, this study aimed to investigate the impact of the interoperability initiative on financial inclusion in Ghana, as well as the challenges experienced in the use of mobile money services.

This study employed a quantitative research method. Secondary data was sourced from the Bank of Ghana and World Bank and analyzed using a regression model. Using convenience sampling, primary data was collected from respondents through questionnaires and analyzed using a Chi-Square test.

The results revealed that there is a relationship between mobile money interoperability and financial inclusion in Ghana. It also revealed that mobile money regulation is not solely responsible for the growth in the adoption of mobile money and the promotion of financial inclusion in the country.

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LIST OF ABBREVIATIONS

BoG……....Bank of Ghana

DOI……..Diffusion of Innovation Theory

GSMA……..Global System for Mobile Communications Association

GHIPSS…….Ghana Interbank Payment and Settlement Systems

MNOs…….……Mobile Network Operators

TAM……Technology Acceptance Model

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CHAPTER 1: INTRODUCTION

1.1 Background

Financial inclusion refers to access and equal opportunity to obtain financial services (Nanda & Kaur, 2016). Being financially included also means that "individuals and businesses have access to useful and affordable financial products and services that meets their needs" (World Bank, 2018). Access to financial services allows individuals and businesses to perform financial transactions such as receiving and making payments, saving, accessing credit, investing, and purchasing insurance. This reduces inequality and alleviates poverty among the socially disadvantaged groups such as the poor and unemployed. Studies have shown that financial inclusion plays a significant role in increasing financial participation, which boosts economic growth (Andrianaivo & Kpodar, 2011; Inoue & Hamori, 2016; Rasheed *et al*., 2016). Therefore, financial inclusion is essential for the growth of a well-functioning financial system in all countries.

The Global Findex Database is a dataset on financial inclusion around the world. The database gathers statistics from a survey of one hundred and fifty thousand (150,000) adults over the age of fifteen (15) in over one hundred and forty (140) countries. The 2017 Global Findex reported that sixty-nine (69) per cent of adults worldwide have an account, leaving thirty-one (31) per cent or about 1.7 billion adults completely unbanked (Demirguc-Kunt *et al*., 2018). Although there has been an increase in the number of registered account holders, there still exist inequalities in financial inclusion levels. Globally, seventy-two (72) per cent of men own accounts in contrast to sixty-five (65) per cent of women, with women also occupying most of the unbanked population at fifty-six (56) per cent. Ninety-four (94) per cent of adults in high-income economies own accounts

compared to sixty-three (63) per cent of adults in developing economies. About sixty-four (64) of the sixty-nine (69) per cent of account holders have their accounts in regulated financial institutions such as banks or microfinance institutions, among others (Demirguc-Kunt *et al*., 2018).

However, existing research has revealed that barriers such as high transaction costs, lack of physical access, strict documentation processes, among others, have accounted for the exclusion of many individuals from accessing formal financial services (Ardic, Heimann & Mylenko, 2011). These monetary and non-monetary barriers have given rise to alternative ways of accessing financial services, with the most prevalent medium being mobile financial services.

Mobile financial services are an avenue for accessing financial services in an effortless, timely and low-cost manner without a bank account. It involves using mobile phones to remotely gain access to financial services (Mothobi & Grzybowski, 2017). As a solution to global financial exclusion, this technology has spread rapidly and is utilized in many developing economies around the world. The Global System for Mobile Communications Association (GSMA), which represents mobile operators worldwide, reported that the number of registered mobile money accounts exceeded one (1) billion in 2019, with about forty-five (45) per cent of account holders located in sub-Saharan Africa (GSMA, 2020). Globally, thirty-seven (37) billion transactions were made, with the total transaction value being $690 billion, up by twenty (20) per cent from the previous year (GSMA, 2020).

One of the most successful mobile money services is “M-Pesa.” Introduced in March 2007 by the Vodafone Group and Safaricom, this Kenyan mobile money service is

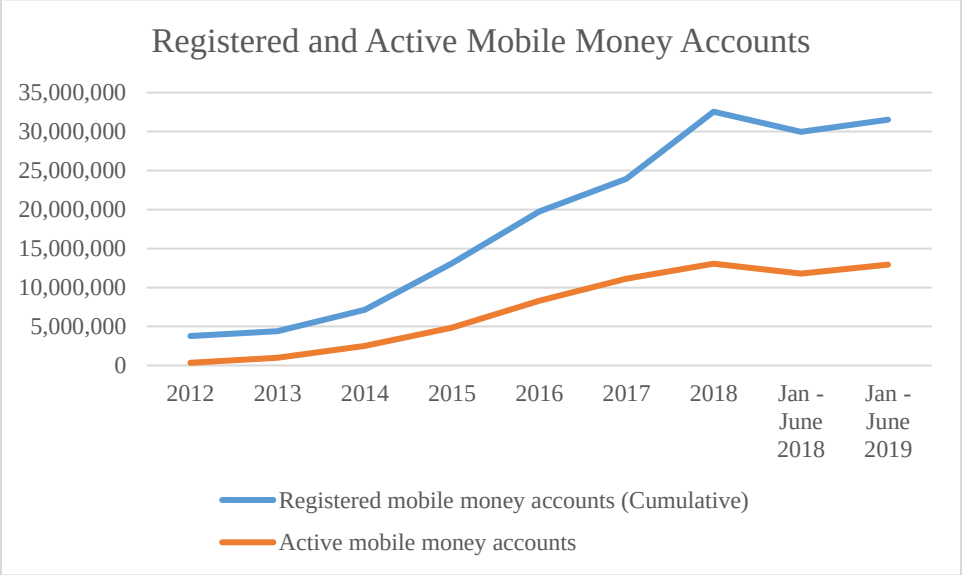
present in seven (7) African countries. As of May 2020, M-Pesa had over forty-one (41) million users who had performed over twelve (12) billion transactions (Vodafone Group, 2020). Previously, Eastern Africa was considered the hub for mobile financial services. However, countries in West Africa, especially Ghana, have been recognized lately for their impressive growth in the use of mobile financial services.

Mobile money services in Ghana is run by three (3) telecommunications companies: Scancom PLC (MTN Ghana), Vodafone Ghana and AirtelTigo Ghana. The adoption of mobile money services in Ghana has snowballed over the last few years. Payment statistics from the Bank of Ghana revealed that the number of registered mobile money accounts in 2012 was 3,778,374 (Bank of Ghana, 2020). As shown in figure 1, the number of registered mobile money accounts snowballed from 4.3 million to 7.2 million to 13.1 million to 19.7million to 23.9million to 32.6 million accounts from 2013 to 2018, respectively (Bank of Ghana, 2020). The usage of mobile money services for financial transactions has also increased with the number of registered accounts. The Bank of Ghana (BoG) measured the number of active mobile money accounts by calculating the number of accounts that made a transaction at least once in the 90 days prior to publishing the report. From 2014 to 2018, the number of active mobile accounts were 2.5 million, 4.9 million, 8.3 million, 11.1 million and 13.1 million, respectively (Bank of Ghana, 2020).

Figure 1 demonstrates that there is an upward trend in the adoption and usage of mobile money in Ghana, which has contributed to the country's growth in achieving a more inclusive financial system. In 2011, the proportion of individuals in Ghana who were financially included as a result of owning an account at a financial institution was twenty-nine (29) per cent. However, the level of financial inclusion increased to fifty-eight (58)

per cent in 2017 as a result of thirty-nine (39) per cent of people owning a mobile money account (Demirguc-Kunt *et al*., 2018).

Figure 1: Registered and Active Mobile Money Accounts in Ghana



Source: Bank of Ghana (2020) Payment Systems Statistics

In its early years, mobile financial services failed to take flight in Ghana like other African countries. This was in part due to the stringent banking guidelines in place at that time. The Bank of Ghana is the regulator of mobile money operations in Ghana. The 2008 Branchless Banking Guidelines was issued by the central bank to support the development of branchless banking; however, it ended up having negative consequences on mobile money development. The guidelines restricted non-bank actors – mobile network operators (MNOs) – from issuing electronic money (e-money). Furthermore, the regulation required banks to lead and control mobile money operations, with MNOs acting as agents (GSMA, 2015). There was no motivation on the part of MNOs to invest resources in the development of the technology, resulting in only three hundred and fifty thousand

Ghanaians adopting mobile money in its first three years. In contrast, countries such as Tanzania had millions of users adopting the technology in the same period.

The BoG began drafting new regulations, and in July 2015, the Electronic-Money and Agents Guidelines replaced the Branchless Banking Guidelines 2008. The new guidelines transformed Ghana's mobile money landscape by allowing regulated financial institutions and licensed non-bank entities, including MNOs, to issue e-money under the Central Bank's supervision (Bank of Ghana, 2015). This provided an incentive for mobile operators to invest in mobile money services (GSMA, 2019).

Aside from the regulatory reform, the introduction of the Mobile Money Interoperability (MMI) contributed to the development of mobile money services in Ghana. In 2017, the Bank of Ghana, through a subsidiary - the Ghana Interbank Payment and Settlement Systems (GHIPSS), mandated mobile money interoperability between mobile money providers and banks (GSMA, 2020). MMI allows the direct transfer of funds between mobile money account holders on different networks (GHIPSS, n.d.). Before the roll-out of this system, users could not directly transfer funds to other networks. Not only has MMI made this possible, but mobile money users can also transfer money between their wallets and bank accounts. The government of Ghana hopes that the introduction of the interoperability system will deepen financial inclusion and increase the convenience of using mobile money (Ghana Chamber of Telecommunications, 2020).

Furthermore, the expansion of mobile money agents across Ghana has also contributed to the development of mobile money services. Mobile money agents are crucial to the mobile money ecosystem because they allow users to withdraw the funds held in their mobile money wallets or deposit additional funds. The number of active agents stood

at five thousand, nine hundred (5,900) in 2012, but in 2017 there were over one hundred and eighty thousand (180,000) active mobile money agents (Bank of Ghana, 2020).

The mobile financial services landscape in Ghana has significantly developed over the past decade, with MNOs introducing various innovative serving offerings to users. Reforms to regulations on the mobile money industry and mobile money interoperability will have an impact on the level of financial inclusion in Ghana. Thus, this thesis seeks to study how developments (regulation reform and MMI) have impacted Ghana's financial inclusion.

1.2 Problem Statement

Research from the Global Findex Database revealed that about 1.7 billion people worldwide are financially excluded. Financial exclusion has been recognized as one of the barriers to overcoming poverty (Donovan, 2012). Individuals without access to financial services have to rely on informal methods of managing their money, leaving them susceptible to many risks (Must & Ludewig, 2010). However, individuals who were previously unbanked are now able to access financial services using mobile payment tools such as mobile money (Pickens et al., 2009).

As of 2017, about fifty-eight (58) per cent of individuals in Ghana are financially included, with thirty-nine (39) per cent of the people using mobile money services. In Kenya, eighty-two (82) per cent of the adult population have access to financial services, with seventy-three (73) per cent of individuals owning a mobile money account and fifty-six (56) per cent owning an account at a financial institution (Demirguc-Kunt *et al*., 2018). In comparison, Kenya has achieved a higher level of financial inclusion because many

individuals are using mobile money to access financial services. Although mobile money cannot be taken as a one-size-fits-all solution to financial exclusion in every country, it can be beneficial to many countries if it is employed.

There are several factors that are responsible for the growth and success of mobile money services in a country. Some factors are country-specific; however, one main factor is how mobile money services are regulated.

Regulation of mobile money services affects the adoption and usage of mobile money services in a country (GSMA, 2019). Regulation also plays a role in how the stakeholders in the mobile money market interact with each other and the financial system, such as granting MNOs and non-bank institutions the ability to issue electronic money.

Currently, there are two models of regulating mobile money services, namely: the bank-led regulatory model and the Mobile Network Operator (MNO)-led regulatory model (Suárez, 2016). The difference between the two models is that, under the bank-led model, mobile network operators are forced to work with banks, and they follow the same regulatory requirements in terms of deposit-taking. However, mobile network operators under the MNO-led model do not abide by the same regulatory conditions as traditional financial institutions. Also, the bank-led model does not stimulate mobile money services growth, unlike the MNO-led model, because of regulatory obstacles under the bank-led model (Suárez, 2016).

Mobile money in Ghana started with the bank-led regulatory model under the 2008 Branchless Banking Guidelines. This inhibited the growth of mobile money services until there was a change in regulations in 2015. Now, Ghana is operating a regulatory model

that is more focused on the growth of MNOs but continually regulated by the central bank. This allowed the Bank of Ghana to mandate interoperability among mobile money providers in Ghana, unlike in Uganda, where the mobile money providers decided on interoperability (GSMA, 2020).

There are many studies on mobile money services and financial inclusion in Ghana. However, very few studies have paid attention to how regulation impacts the success of mobile money services in Ghana. Therefore, this study aims to examine the impact of regulations and mobile money interoperability on financial inclusion in the country.

1.3 Research Relevance

Mobile money interoperability is new in Ghana, and it is transforming the landscape of financial services in Ghana. It is crucial to gain an understanding of the impact MMI is having on financial inclusion. Not only will this research be relevant in Ghana, but it will provide insights to other countries that are taking steps to develop a mobile money interoperability system. Currently, the 2015 Electronic-Money and Agents Guidelines dictates how mobile money services are operated in Ghana. The insights from this research on mobile money regulation will be relevant to regulators such as the Central Bank when making future decisions on regulation and taxation.

Furthermore, mobile network operators will also find this research relevant. It would provide knowledge that would guide their product and service innovations to better tackle financial exclusion worldwide. The government of Ghana has the vision to increase the level of financial inclusion in the country from fifty-eight (58) per cent to eighty-five (85) per cent by 2023, and the National Financial Inclusion and Development Strategy

(NFIDS) was formed to achieve that goal. Therefore, this research will be relevant to the government since it will provide insights into how mobile financial services' development is impacting financial inclusion. This research will guide policymakers to formulate policies that would promote universal financial inclusion in the country.

1.4 Research Objectives

The objectives of the research are:

- To examine the extent to which mobile money regulation has improved financial inclusion in Ghana.
- To examine the extent to which mobile money interoperability has improved financial inclusion in Ghana.
- To examine the challenges facing the use of mobile money services in Ghana.

1.5 Research Questions

- How have regulations on mobile money services improved financial inclusion in Ghana?
- How has mobile money interoperability improved financial inclusion in Ghana?
- What are the challenges facing the use of mobile money services in Ghana?

1.6 Methodology

A quantitative research approach would be used in answering the research questions. This method uses numerical data to explain a phenomenon. Primary data for this study was collected through online questionnaires, and secondary data was sourced from the World Bank and Bank of Ghana websites.

1.7 Outline of the Dissertation

The outline of this thesis is as follows: Chapter two discusses the literature review, and chapter three discusses the methodology in more detail. Chapter four reveals the results from the research. Finally, chapter five concludes with a summary and recommendations of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter analyses existing literature on mobile money services and financial inclusion and is divided into two sections. The first section focuses on the theoretical framework and the second section focuses on the empirical review. The chapter concludes with a summary of chapter two.

2.2 Theoretical Framework

2.2.1 Technology Acceptance Model (TAM)

Developed by Fred Davis, the Technology Acceptance Model is a theory that explains the intention of users to adopt and make use of a technology (Davis, 1985). The model predicts that an individual's decision to adopt and use new technology is affected by two factors: Perceived usefulness (PU) and Perceived ease of use (PEOU) (Davis, 1989).

Perceived usefulness is the extent to which an individual believes that utilizing a system will enhance their work output (Davis, 1989). Perceived ease of use is the extent to which an individual believes that a system would be straightforward and effortless to use, which encourages its adoption (Davis, 1989).

In the context of mobile money services, PU can be defined as how helpful an individual finds the use of mobile money services to integrate it into his or her everyday activities (Kleijnen, Wetzels, & De Ruyter, 2004). According to existing research, PU is positively associated with the adoption of mobile payment systems by consumers (Kim,

Mirusmonov, & Lee, 2010; Padashetty & Kishore, 2013; Zhou, 2011). Thus, many individuals are adopting mobile money services because they find the service beneficial. PEOU in the mobile money includes the extent to which it is simple for individuals to register for mobile money services, to access services on their mobile phones and the availability of mobile money agents (Tobbin & Kuwornu, 2011).

2.2.2 Diffusion of Innovation Theory (DOI)

The Diffusion of Innovation theory, proposed by Everett Rogers in 1962, is a theory that explains how new ideas and technologies spread through a social structure (Rogers, 1995). Rogers defined diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" and innovation as "an idea, practice or object that is perceived as new by an individual or another unit of adoption" (1995, p.10).

According to Rogers (1995), "there are five main factors that influence the adoption of an innovation, which are: relative advantage, complexity, compatibility, trialability and observability." Relative Advantage is the degree to which a product/innovation is superior to existing innovations; Compatibility is the degree to which an innovation is well-suited to an individual's job; Complexity is the extent to which a person perceives innovation as difficult to use; Trialability is the extent to which an individual can experiment with innovation before adopting or rejecting it; and Observability is the extent to which the results of innovation is seen by others to be also adopted by them (Rogers, 1995).

2.3 Overview of Financial Inclusion

Financial inclusion refers to the availability and ease of access to the financial system for all members of the economy (Sarma & Pais, 2011). An inclusive financial system allows all income groups to access affordable and quality financial services such as credit, insurance, or investment products to handle their financial risks better. It also enhances the welfare of members of the society by providing an avenue for secure savings and facilitating a range of efficient financial services (Sarma & Pais, 2011).

2.3.1 Measuring Financial Inclusion

Previously, World Development Indicators by the World Bank were used to measure financial inclusion across countries. Some of these indicators included: the number of bank accounts per thousand (1,000) adults and the number of Bank Branches per one hundred thousand (100,000) adults (Sarma, 2008). While the introduction of tools for the measurement of financial inclusion can unarguably be evaluated as a step in the right direction, concerns have been raised about its implementation/management process. For example, Sarma (2008) has observed and cautioned that "such indicators, while used individually, provide only partial information on the inclusiveness of the financial system of an economy. Using individual indicators can lead to a misleading understanding of the extent of financial inclusion in an economy" (p.4).

Sarma (2008) developed a multidimensional index of financial inclusion (IFI) that can be used to measure and compare the extent of financial inclusion across economies at a particular time point. The IFI measures financial inclusion based on some dimensions and incorporates it into one single number between zero (0) and one (1). 0 represents complete financial exclusion, and 1 indicates total financial inclusion in an economy. The index considers three dimensions to measure the inclusiveness of a financial system:

banking penetration (BP), availability of banking services (BS) and usage of the banking system (BU).

Banking penetration (dimension 1)

According to Sarma (2008), an inclusive financial system should penetrate widely amongst its users; that is, an inclusive financial system should be accessible and have as many users as possible. Banking penetration is measured using the size of the banked population, i.e. the number of people having a bank account. If every person has a bank account, then the value of this measure would be 1 (Sarma, 2008).

Availability of banking services (dimension 2)

An inclusive financial system should have services that are readily available to its users. This dimension is measured by the number of bank outlets (per 1000 population) or by the number of ATM per 1000 people (Sarma, 2008).

Usage (dimension 3)

A study by Kempson, Atkinson, and Pilley (2004) showed that "in some highly-banked countries, several people with a bank account are nonetheless making very little use of the services on offer" (p. 13). These people are the "under-banked" population. Owning a bank account is not sufficient for an inclusive financial system if the banking services are not utilized. Therefore, the index's usage dimension measures the volume of credit and deposit as a proportion of the country's GDP.

Similarly, the World Bank prepared a reference framework for Financial Inclusion Strategies, which included dimensions/indicators to measure financial inclusion. The

paper, authored by Pearce Douglas and Ortega Claudia (2012), identified three leading indicators to consider when measuring financial inclusion: Access indicators, Usage indicators and Quality indicators.

"Access indicators reflect the depth of outreach of financial services or demand-side barriers that customers face to access financial institutions" (Pearce & Ortega, 2012). "Usage indicators measure how clients use financial services, such as the regularity and duration of the financial product/service over time" (Pearce & Ortega, 2012). "Quality indicators measure whether the financial products and services match clients' needs, the range of options available to customers, and clients' awareness and understanding of financial products" (Pearce & Ortega, 2012).

2.3.2 Mobile Money and Financial Inclusion

Mobile money is a tool that allows people to perform financial transactions using their mobile phones (Jack & Suri, 2011). Mobile money plays an important part in tackling financial exclusion as mobile money services are present in all countries where less than a third of the population have an account at a formal financial institution (GSMA, 2020). The success of mobile money and its impact on financial inclusion can be measured using metrics such as the number of registered mobile money accounts and the number of active mobile money accounts. As of 2019, over one billion users own registered mobile money accounts, with three hundred and seventy-two million active users (GSMA, 2020).

2.3.3 Determinants of Mobile money adoption

The success of mobile money services is impacted by several factors specific to each country, their regulatory environment, and their mobile money industry.

Mobile Money Regulation

The regulatory environment in a country is a critical factor in the success of mobile money services. Regulation affects the ease with which individuals can register to a mobile money service, the registration requirements for mobile money agent networks, and regulation on customer protection, among others (GSMA, 2019). Generally, regulations are categorized as either enabling or non-enabling. The GSMA's mobile money regulatory index is a tool that was launched to assess the effectiveness of mobile money regulatory frameworks across six dimensions and 26 indicators in 90 countries (GSMA, 2019). Generally, there is a clear positive correlation between high mobile money adoption rates and enabling regulatory environments (GSMA, 2019).

Distribution/Agent Networks

Mobile money agents are stakeholders that are key to the success of mobile money services. Agents are the primary way customers interact with the mobile money system. They provide services that include mobile money account registration, cash-in and cash-out services to allow customers to convert physical cash into e-money and vice versa, Over-The-Counter (OTC) transactions, among others (Lal & Sachdev, 2015). The number of agents or agent outlets per population is an indicator that can measure the distribution network of mobile money in a country.

Pricing/Fees

The use of mobile money services come with fees that mobile network operators set. However, such fees are either transaction-based (i.e., charged per transaction) or charged to customers. Fees cater for the cost of MNOs running mobile money services.

However, mobile money fees can also be used to encourage the behaviours of customers. For instance, MNOs charge higher fees for cash-out services vs cash-in services to discourage the use of cash and charge higher fees to individuals who are not registered users to encourage them to register (Lal & Sachdev, 2015). Additionally, other transactional costs, such as the cost of registering for a mobile money account, can influence consumers' intention to use mobile money services (Tobbin & Kuwornu, 2011).

Education

Education is another factor that is significant in the adoption of mobile money. Generally, owning a financial account is lower among adults that are less educated. Evidence from the 2017 Global Findex revealed that 92 per cent of individuals with higher educational attainment owned a financial account compared to 56 per cent of adults with a primary education or less owning accounts (Demirguc-Kunt *et al*., 2018). The level of education influences the awareness individuals have on mobile money services, increasing the probability of adopting mobile money services (Gichuki & Mulu-Mutuku, 2018).

Gross Domestic Product (GDP)

GDP per capita and GDP growth are two macroeconomic factors that impact the success of mobile money services. A country's GDP per capita is positively associated with sending and receiving money through mobile phones, while GDP growth drives mobile money adoption rates (Lashitew et al., 2019).

2.4 Empirical Review

2.4.1 Developing Mobile Money Services

Gutierrez & Choi (2014) studied how mobile money services had developed in two countries: The Republic of Korea, a high-income country, and Uganda, a low-income country. In terms of the levels of financial inclusion in Korea and Uganda measured through mobile money and bank account ownership, the 2014 Global Findex reported that ninety-four (94) per cent of adults own account in Korea compared to forty-four (44) per cent in Uganda. The 2017 Global Findex reported account ownership at ninety-five (95) per cent in Korea to fifty-nine (59) per cent in Uganda (Demirguc-Kunt *et al*., 2018). The level of financial inclusion in Uganda increased from forty-four (44) per cent to fifty-nine (59) per cent because Uganda is one of the countries that have more than 20 per cent of the total adult population owning mobile money accounts only (Demirguc-Kunt *et al*., 2018).

Although account ownership has increased in both countries, Korea is financially inclusive than Uganda. Korea also has an active telecommunications sector with some of the advanced technologies in the world.

Gutierrez & Choi (2014) also studied both economies' regulatory environment using Porteous's regulatory environment model to determine its openness and certainty. The study concluded that mobile money services in developing and developed countries require a competitive telecommunications sector and a regulatory environment that allows non-financial institutions to issue money and use banking agents (Gutierrez & Choi, 2014).

2.4.2 Mobile Money Regulation

The introduction of mobile money has created a fusion between the banking industry and the telecommunications industry, which has required a transformation in the regulatory environment to control and supervise service providers' activities (Bara, 2013).

Groppa and Curi (2012) identified that a regulatory framework is essential to manage the financial risk involved in operating a mobile payment system, protect users' welfare, and ensure the protection of the financial system against money laundering and financing the activities of terrorists. The right regulatory environment is necessary for the success of mobile financial services in promoting financial inclusion.

Suárez (2016) studied the two regulatory models in two countries: Mexico, which employs the bank-led model, and Kenya, which operates the MNO-led model. The results revealed that the bank-led regulatory model limited mobile money diffusion because of how stringent regulations were. However, the MNO-led regulatory model employed in Kenya resulted in much higher diffusion rates and enhanced financial inclusion in the country.

Evidence from Evans & Pirchio (2014) has shown an increase in the adoption of mobile money when regulators allow MNOs to lead the deployment of mobile money services. This supports the findings of Suárez (2016).

2.5.1 Mobile Money Interoperability

Mobile money interoperability allows customers to transfer money to other mobile money accounts registered on different networks (account-to-account interoperability) or to transfer money between a mobile money account and a bank account (wallet-to-account interoperability) (GSMA, 2020).

MMI can occur in different forms/levels. For instance, interoperability at a platform level allows users with mobile money accounts on one mobile network to transfer money to users on other networks (Kumar & Tarazi, 2012). Interoperability at the agent level

allows for a mobile money agent registered on one mobile network to serve users registered on other networks (Kumar & Tarazi, 2012). Finally, interoperability on the customer level allows a user to access their account using any sim card on the same network (Kumar & Tarazi, 2012).

The benefit of MMI is that it provides additional value to users by enhancing the methods of using mobile money services. MMI provides convenience for users (GhIPSS, n.d.) as many users can now send money to other users on different networks without having to own more than one mobile money account on different networks to be able to send and receive money from other users. MMI also provides users with access to their money in their bank account and money account and allows for the seamless transfer of money between these accounts. Other benefits include a reduction in the cost of transactions, a lower dependence on cash and an overall increase in financial inclusiveness.

2.6 Summary

Studies have shown that an enabling regulatory environment is essential for developing mobile money services in any country. The regulatory model that a country uses on its mobile money industry – bank-led or MNO-led model – affects the level of diffusion and usage of mobile money services by its citizens, affecting the success of mobile money in the country.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This study examined the impact of mobile money regulation on financial inclusion in Ghana. It also investigated the impact of mobile money interoperability on financial inclusion in Ghana. This chapter discusses the research methods, hypotheses, and data analysis techniques employed in this study.

3.2 Research Design

This study employed a quantitative research design. According to Creswell (1994), quantitative research is a type of research that involves collecting and analyzing numerical data to explain a phenomenon.

This study employed descriptive and correlational research designs. Descriptive research describes participants' attitude during an investigation and takes place in the participant's natural settings (VanderStoep & Johnson, 2008). Therefore, this study was conducted in the natural environments of the participants. Correlational research identifies the relationship between variables (VanderStoep & Johnson, 2008).

This research was divided into two main parts based on the research objectives. The first research objective examined the extent to which mobile money regulation has improved financial inclusion in Ghana. This objective involved the use of secondary data sourced from the World Bank's Global Financial Inclusion database, Bank of Ghana, and the United Nations Development Programme (UNDP) reports.

The second research objective examined the extent to which mobile money interoperability has improved financial inclusion in Ghana. This objective used primary data that was collected through questionnaires.

3.3 Research Scope

This research aims to examine the extent to which mobile money regulation and mobile money interoperability have improved financial inclusion in Ghana. This study is based on the citizens of Ghana. The target population of this research are individuals who are above the age of eighteen (18). The justification for the target population is, persons below the age of eighteen (18) cannot open a mobile money wallet unless they provide a guarantor (MTN Ghana, 2019).

3.4 Variables and Data sources

As discussed in the literature review, mobile money services' success is affected by several factors that can be measured using metrics such as the number of Registered Mobile Money Accounts Ratio. This variable represents the dependent variable. The independent variables employed in this research include Mobile Money Regulation, Agent Networks, Bank Penetration, Education and Gross Domestic Product (GDP).

The data collected from these sources will cover the period from 2012 to 2019.

Variable	Definition	Source
Registered Mobile Money Accounts (RAR) ratio	The cumulative number of registered mobile money	Bank of Ghana website

	accounts to the total population	
Mobile Money Regulation (REG)	The Mobile Money Regulatory Index is a tool that measures the effectiveness of mobile money regulatory frameworks in 90 countries	GSMA's Mobile Money Regulatory Index website
Distribution/Agent Networks (DIST)	Cumulative number of registered agents	Bank of Ghana website
Education Index (LIT)	Average of Mean Years of Schooling and Expected Years of Schooling	Human Development Reports - UNDP
Gross Domestic Product (GDP)	The monetary value of all finished goods and services produced within a country	World Bank website
Bank Penetration (BANK)	The number of bank accounts per 1000 adults	World Bank website

3.5 Hypothesis

This study aims to determine if mobile money regulation and mobile money interoperability have improved financial inclusion in Ghana. Thus, the hypotheses to be tested in this research are:

H_0: There is no relationship between mobile money regulation and financial inclusion in Ghana.

H_1: There is a relationship between mobile money regulation and financial inclusion in Ghana.

H_0: There is no relationship between mobile money interoperability and financial inclusion in Ghana.

H_1: There is a relationship between mobile money interoperability and financial inclusion in Ghana.

3.6 Sampling Size and Method

The second research objective involves the use of primary data. The study would be conducted in Ghana. The participants used in this research would be citizens of Ghana above the age of eighteen (18). The size of the population is approximately twenty (20) million people. Using a confidence level of 95% with a margin of error of +/-5%, the sample representative (sample size) of the population is 385 people.

The sampling technique employed in selecting respondents is convenience sampling. Convenience sampling is a sampling technique in which “members of the target population who meet certain functional requirements, such as ease of access, geographic

proximity, availability at a specific time, or willingness to participate, are included in the sample" (Etikan, Musa & Alkassim, 2016, p.3).

In their study to investigate the factors that influence the intention of Ghanaian customers to adopt and use mobile money transfer technology, Tobbin and Kuwornu (2011) adopted the convenience sampling technique to collect data from 288 respondents through questionnaires. In similar research, Masocha and Dzomonda (2018) also employed the convenience sampling technique to collect data from managers of small businesses in Zimbabwe for their study on the adoption of mobile money services and the subsequent performance of Small and Medium Enterprises (SMEs).

The convenience sampling technique is used in this study because of time and resources constraints and because it is impracticable to randomly sample the whole population. The limitation with this technique is that it is a non-probability sampling technique; therefore, the sample is not representative of the population (Etikan et al., 2016)

3.7 Data Collection Tools

Data collection for the primary data would be through a questionnaire. The questionnaire is in English and contained closed-ended questions, where participants respond by selecting the option(s) that apply to them. The questionnaire would be distributed electronically. The use of a questionnaire in this research is because of the tool's ability to collect responses from many people while being cost-effective.

The questionnaire consisted of four sections. The first section focused on collecting information relating to the demographic characteristics of respondents, including gender, age range, education level and employment status. The second section aimed at gathering

information on mobile money use by respondents. The third section focused on collecting information relating to mobile money interoperability: Account-to-Account (A2A) interoperability and Wallet to Account (W2A) interoperability. The last section was designed to collect information relating to the challenges of using mobile money services.

3.8 Data Analysis

Secondary Data

Secondary data will be analyzed using a linear regression model for each dependent variable and the independent variables to address the first research objective. The regression model to be used in this study is:

Registered Mobile Money Accounts Ratio (RAR):

$$RAR = \beta 0 + \beta 1(REG) + \beta 2(DIST) + \beta 3(BANK) + \beta 4(LIT) + \beta 5(GDP) + \varepsilon$$

Where:

$\beta 0$ is the intercept,

ε is the error.

Primary Data

In addressing the second research objective on mobile money interoperability and its impact on financial inclusion, the quantitative data collected will be analyzed using descriptive statistics and inferential statistics. Descriptive statistics summarize the data's characteristics, while inferential statistics conclude significant relationships between variables (VanderStoep & Johnson, 2008).

The statistical software used in analyzing both primary and secondary data is Microsoft Excel and SPSS.

3.9 Ethical Considerations

The questionnaire was reviewed and approved by the Human Subjects Review Committee before being used in this research. This is to ensure that the safety of the human subjects involved in this study is highly prioritized.

3.10 Limitations of the Study

Due to time and resource constraints, this study cannot be generalized to the whole population since the sample is not representative of the population. Secondly, the use of a questionnaire in collecting data for this research was convenient and cost-effective. However, it is limited to people's self-serving bias where respondents tend to report their behaviours and intentions in a positive light (Vanderstoep & Johnston, 2009).

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents the findings from the data collection, data analysis and results.

4.2 Respondents' Characteristics

This study targeted Ghanaians above the age of eighteen (18). A total number of 337 individuals participated in this study.

Demographic Characteristics

With regard to gender distribution, 58% of the respondents were males, and 42% were females.

Table 1: *Gender Distribution of Respondents*

Gender	**Frequency**	**Percentage (%)**
Male	195	58%
Female	142	42%

With regard to age range, 64% of the respondents were between ages 18-29, 13% were between 30-39 years, 12% were between ages 40-49, 11% were between ages 50-59, and about 1% of the respondents were above 60 years.

Table 2: *Age Distribution of Respondents*

Age Range	**Frequency**	**Percentage (%)**
18-29	214	64%
30-39	44	13%
40-49	39	12%
50-59	38	11%

Above 60	2	1%

The distribution of respondents in relation to their highest education level are as follows: 92% of the respondents have attained a university education, 7% have attained a senior high school education and the remaining either have a junior high school education or no formal education. None of the respondents recorded primary education as their highest level of education.

Table 3: *Education Distribution of Respondents*

Highest Level of Education	**Frequency**	**Percentage (%)**
No formal education	1	0.3%
Primary	0	0%
Junior High School	1	0.3%
Senior High School	24	7.1%
Tertiary	311	92.3%

In terms of the employment status, 40% were students, 43% of respondents were employed, 12% were self-employed, 5% were unemployed, and 1% were retired. Furthermore, there was no respondent who was unable to work due to health conditions or disabilities, among others.

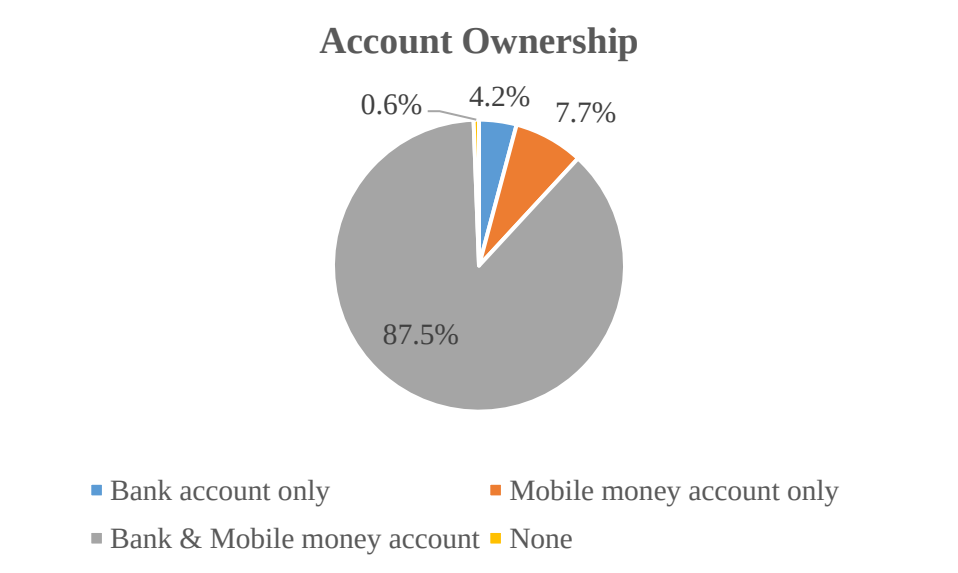
Table 4: *Employment Status of Respondents*

Employment status	**Frequency**	**Percentage (%)**
Student	134	40%
Employed	145	43%
Self-employed	40	12%
Unemployed	16	5%
Retired	2	1%
Unable to work	0	0%

Level of Financial Inclusion

Figure 2 below provides information on account ownership among respondents. The findings reveal that 4.2% (14 respondents) own a bank account only, 7.7% own only a mobile money account only, 87.5% (295) own both a bank account and a mobile money account and 0.6% (2) respondents own neither a bank account nor a mobile money account. These findings suggest that the level of financial inclusion in Ghana has greatly improved, with over 99% of individuals being financially included.

Figure 2: Account Ownership Among Respondents



4.3 Mobile Money Services

Mobile Money Account Ownership

Out of the 337 respondents, 95% (321 respondents) reported owning a mobile money account, and 5% (16 respondents) did not own a mobile money account.

Figure 3 presents the findings on why respondents did not own a mobile money account. In terms of perceived usefulness (Davis, 1989), three respondents did not have any use for mobile money services. In terms of perceived risk, five respondents revealed that they did not find mobile money services safe to use. 4 respondents revealed that they preferred using cash instead of mobile money and two respondents lacked the necessary documentation to register for a mobile money account. Furthermore, five respondents had other reasons why they did not own a mobile money account. Four of the respondents did not own a mobile money account because they had not registered yet, and 1 respondent did not want to own a mobile money account.

Figure 3: Reasons for not Using Mobile Money Services

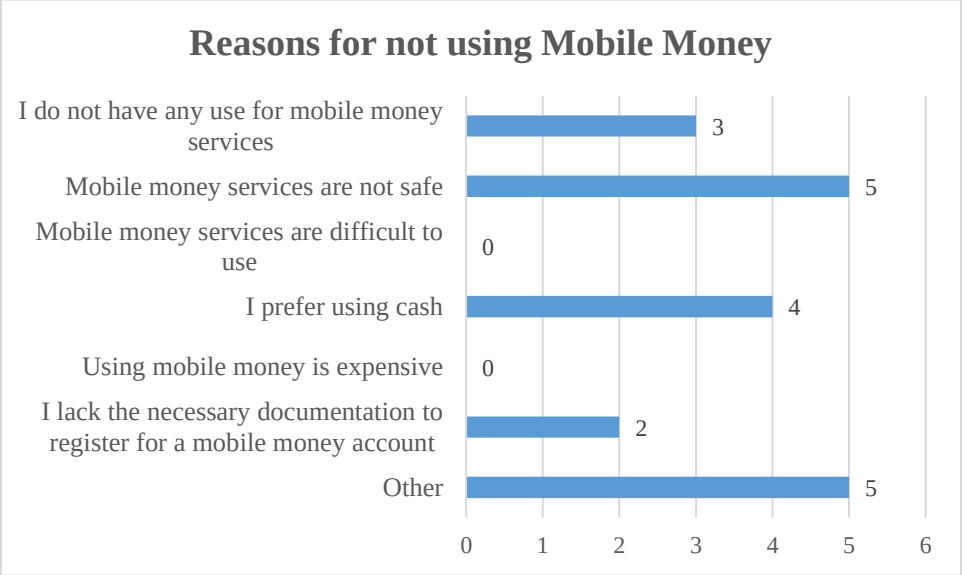


Figure 4 presents a breakdown of mobile money account ownership by the MNO registered with. The information shows that 59% (272 respondents) owned a mobile money account with MTN Ghana, 31% (146 respondents) owned a mobile money account with Vodafone Ghana, and 10% (48 respondents) owned an account with AirtelTigo Ghana.

The results suggest that MTN Ghana owns a majority of the market share for mobile money in Ghana.

Figure 4: Mobile Money Account Ownership by MNO

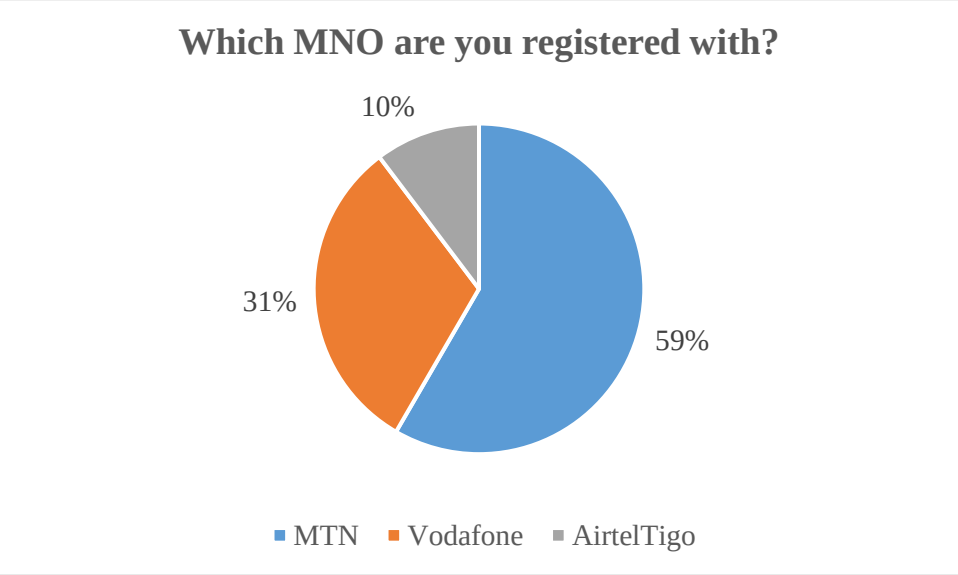
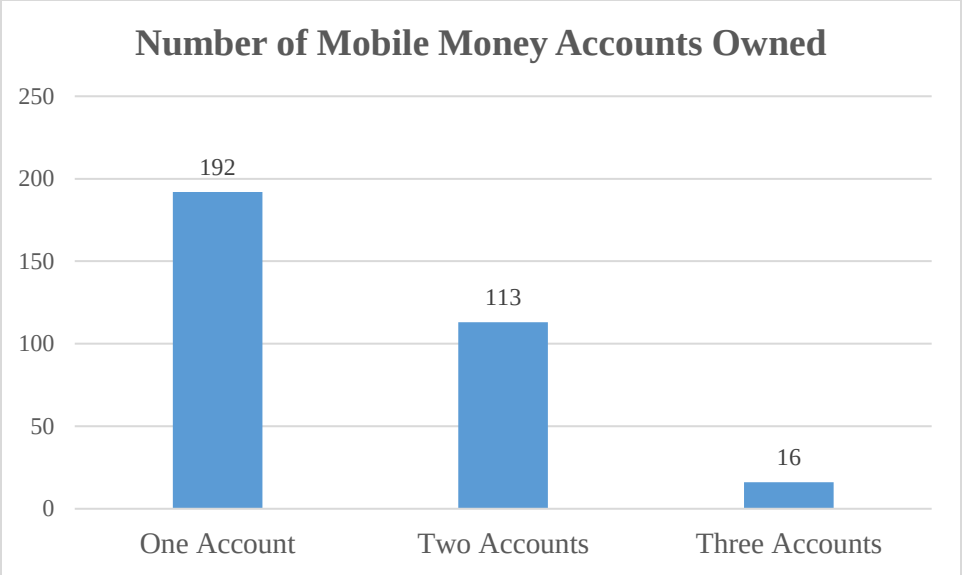


Figure 5 below presents information on the number of mobile money accounts owned by each respondent. The results show that 60% (192 respondents) own a single mobile money account with one of the MNOs (MTN, Vodafone and AirtelTigo). 35% (113 respondents) own two mobile money accounts, and 5% (16 respondents) own three mobile money accounts.

Figure 5: Number of Mobile Money Accounts by Respondents



Usage of Mobile Money

Figure 6 below presents information on the duration of mobile money accounts ownerships by the respondents. The results show that 7% (21 respondents) have owned a mobile money account for less than a year, 36% (117 respondents) have owned a mobile money account for 1-3 years now, 44% (141 respondents) have owned a mobile money account for 4-7 years now, 8% (27 respondents) have owned a mobile money account for 8-10 years now, and 5% (15 respondents) have owned a mobile money account for more than years. The findings suggest that most mobile money accounts holders in Ghana have owned their account for 4-7 years, and a majority of account holders have had their account for at least 1 to 7 years now.

Figure 6: Duration of Mobile Money Account Ownership

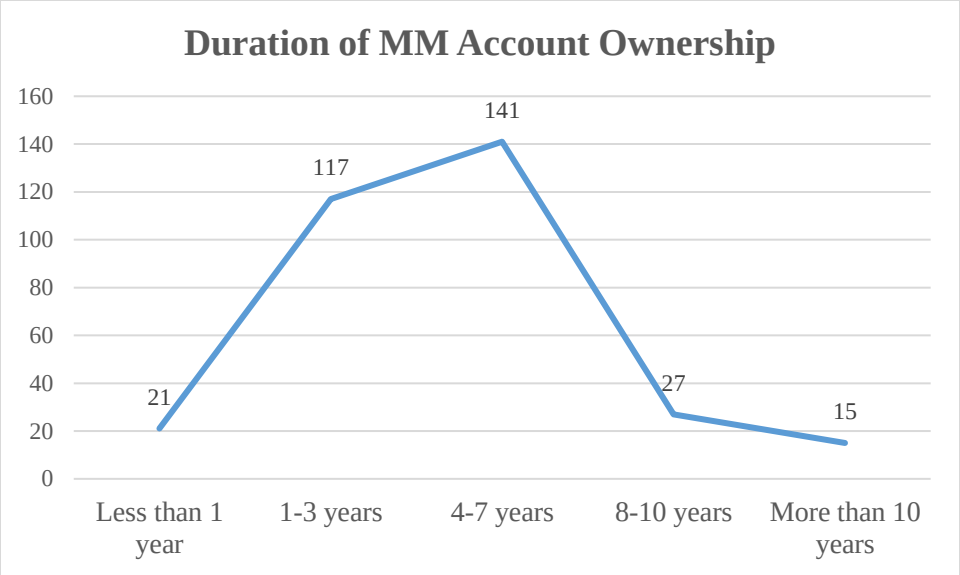


Figure 7 below presents information on the frequency of mobile money usage by respondents. The results show that 29% (94 respondents) use their mobile money accounts less than three times a week, 44% (137 respondents) use their mobile money accounts 3-7 times a week, and 28% (90 respondents) use their mobile money accounts more than seven times a week.

Figure 7: Frequency of Using Mobile Money Services

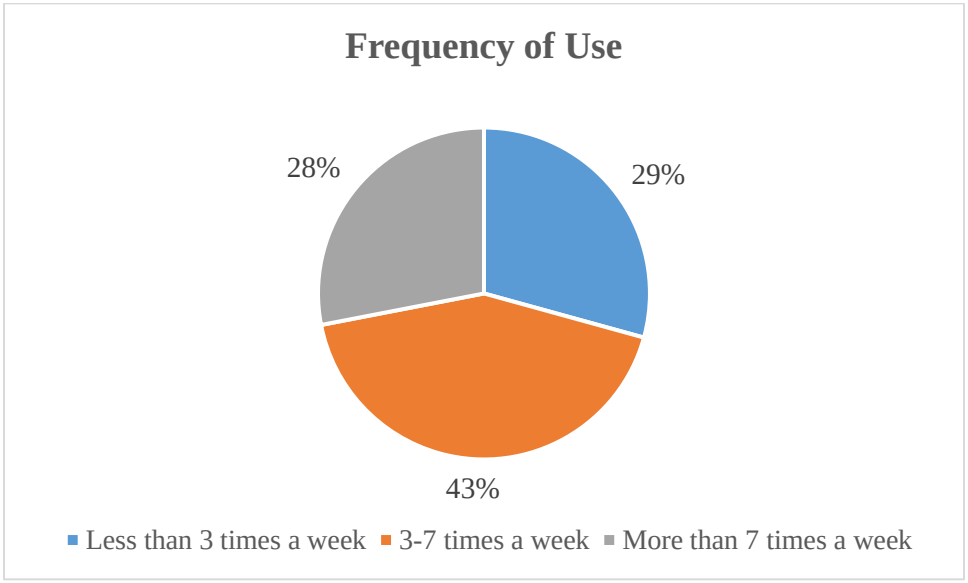
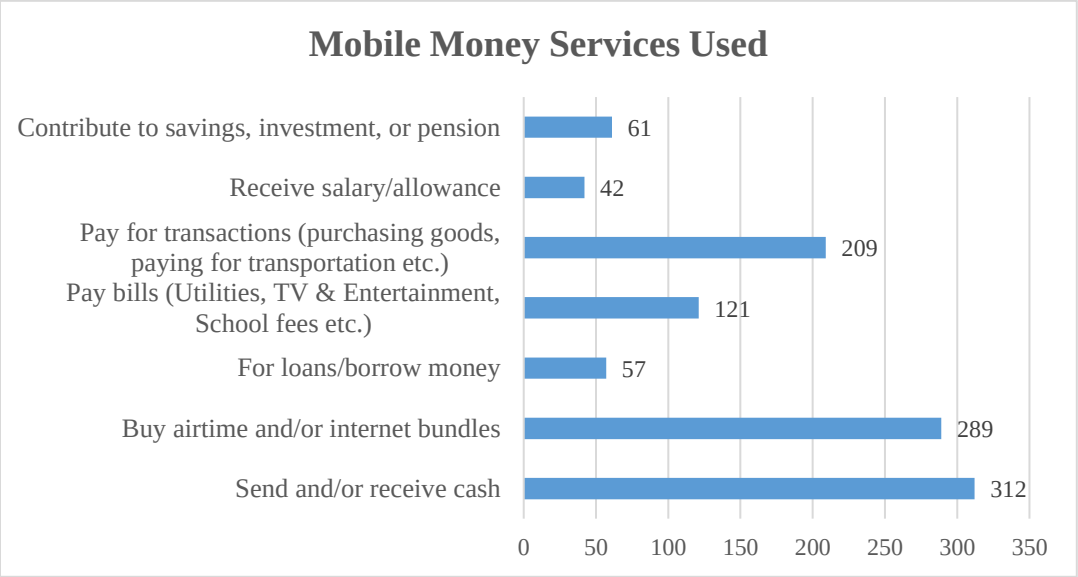


Figure 8 below presents information on the mobile money services used by respondents. The results show that almost all of the respondents use mobile money to send and/or receive cash. The majority of the respondents also use mobile money to buy airtime or internet bundles, pay for bills, and also pay for their transactions. Only a few respondents use their mobile money account to receive salaries or allowances, to obtain loans and to contribute to savings, investment, or a pension plan.

Figure 8: Mobile Money Services Used



4.4 Mobile Money Interoperability

Account-to-Account Interoperability

Figure 9 provides information on account-to-account interoperability among the respondents. Out of the 321 respondents who owned a mobile money account, 89% (285 respondents) have sent money to another user registered on a different mobile network, and 74% (239 respondents) have received money that was sent from another user registered on a different mobile network.

Figure 9: Distribution of Account-to-Account (A2A) Interoperability

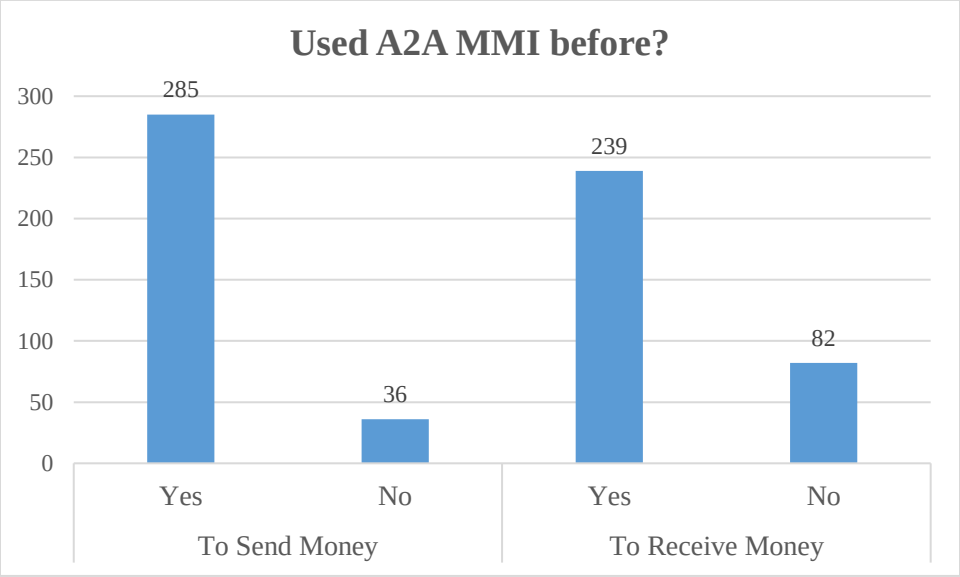
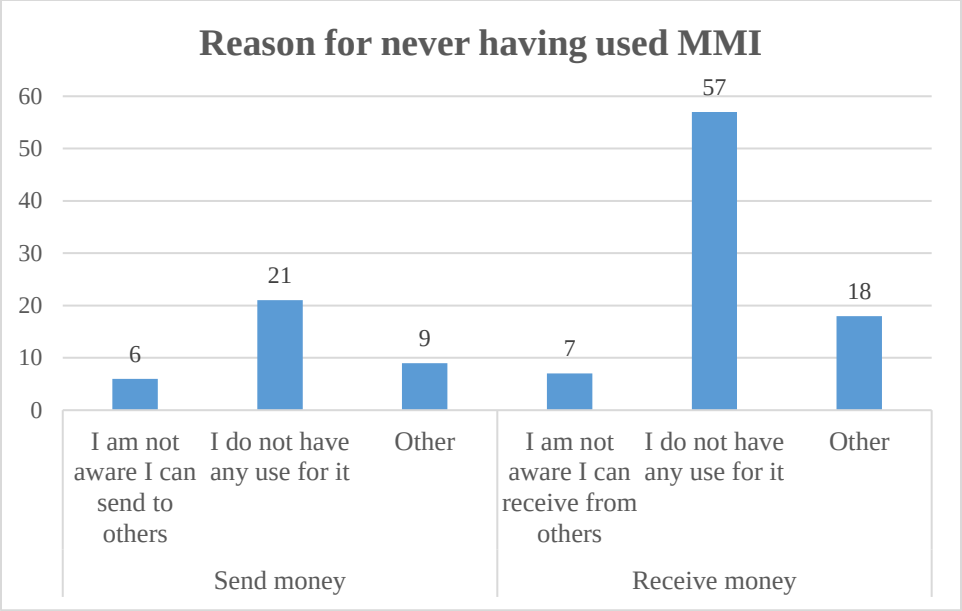


Figure 10 presents information on the reasons why some of the respondents have never used MMI before. Out of the 118 respondents who have never used MMI to send or receive money, 11% (13 respondents) reported that they were not aware they could send and receive money to users on other networks, 66% (78 respondents) do not have any use for MMI and 23% (27 respondents) have other reasons for never having used MMI. These reasons include transaction failures when using MMI, higher transaction charges involved with the use of MMI, the use of a bank app to send money to other mobile money users and increased complexity in performing MMI transactions.

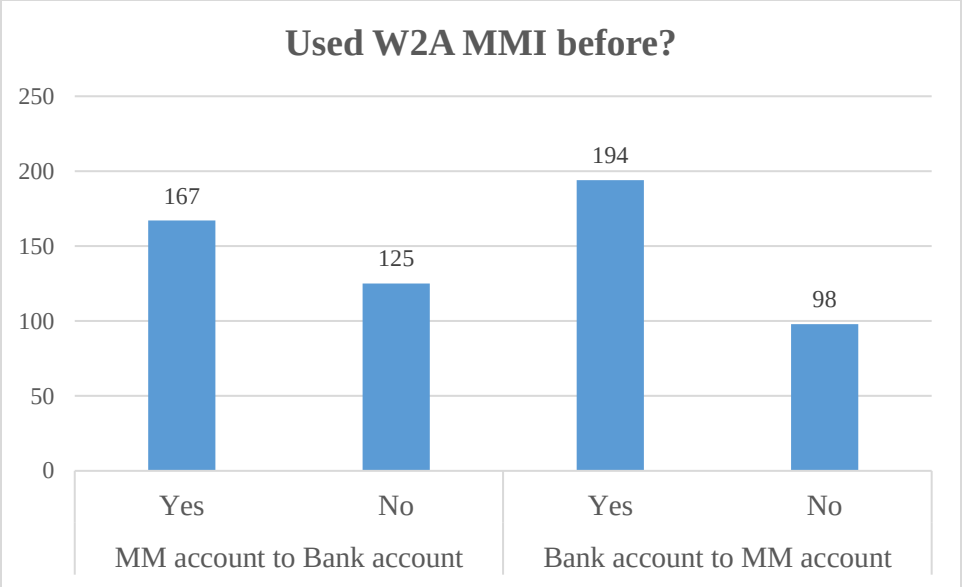
Figure 10: Reasons for never having used A2A Interoperability



Wallet-to-Account Interoperability

Figure 11 provides information on wallet-to-account interoperability among the respondents. Out of the 292 respondents who own a bank account and mobile money account, 57% (167 respondents) have sent money directly from their mobile money account to their bank account before, and 43% (125 respondents) never have, while 66% (194 respondents) have sent money directly from their bank account to their mobile money account before and 34% (98 respondents) never have.

Figure 11: Distribution of Wallet-to-Account (A2A) Interoperability



4.5 Challenges in the Use of Mobile Money

Figure 12 reports on whether the respondents have experienced any form of challenge in their use of mobile money services. Out of the 321 respondents who own a mobile money account, 69% (221 respondents) have experienced some form of challenge, and 31% (100 respondents) have never experienced any challenges.

Figure 12: Challenges in the Use of Mobile Money

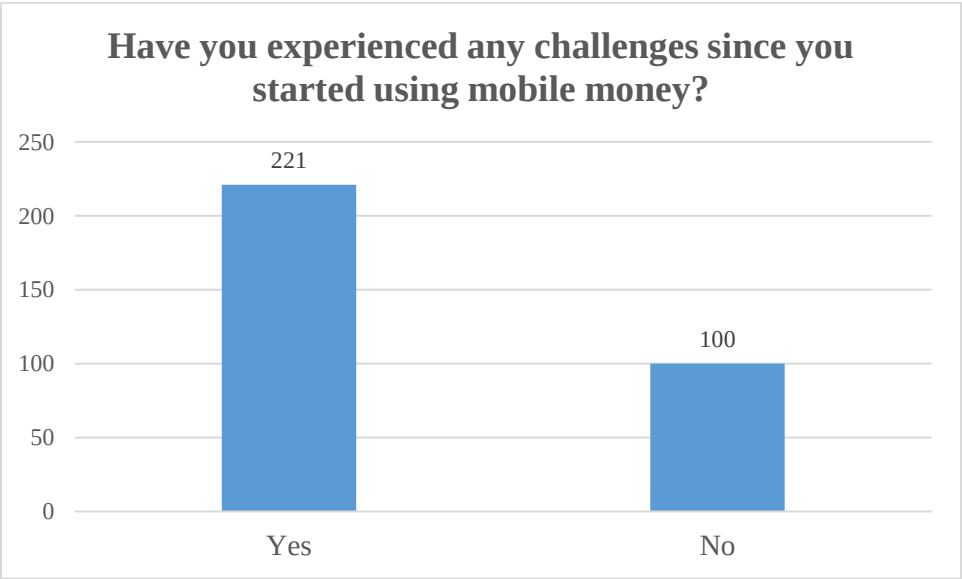
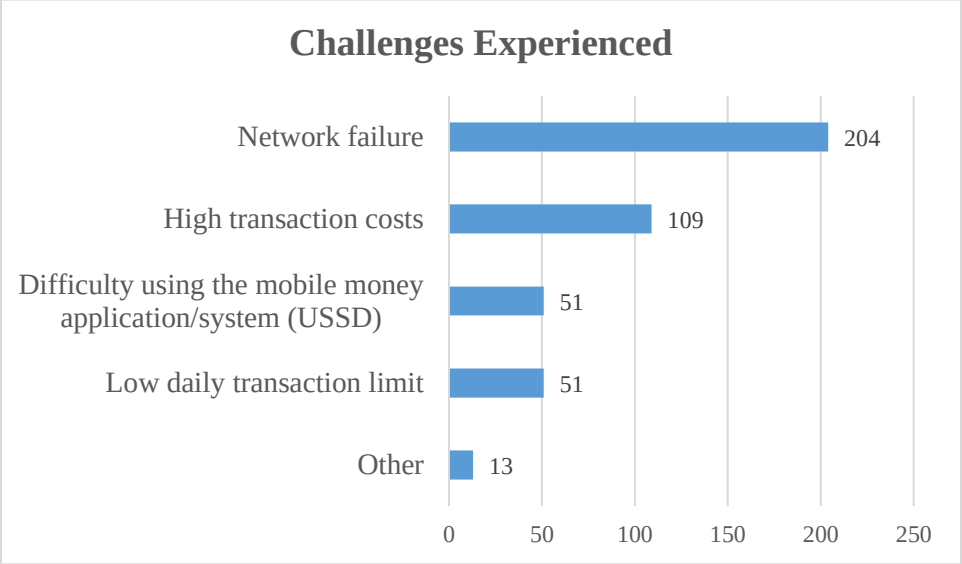


Figure 13 provides information on the challenges experienced. 48% out of the 221 respondents (204 respondents) have had experiences with network failure in the use of mobile money services. 25% (109 respondents) believe that the transaction costs involved in mobile money use are high, 12% (51 respondents) have experienced difficulty in using the USSD application for mobile money services, 12% (51 respondents) believe the daily transaction limit is low and 3% of respondents have experienced other challenges. Some of these challenges include the inability to send money to users on other networks due to network failure, the difficulty in reversing wrong mobile money transactions and the risk of being duped and frauded by mobile money fraudsters.

Figure 13: Challenges Experienced in the Use of Mobile Money



4.6 Relationship between Mobile Money Interoperability and Financial Inclusion

A chi-square test was used to find the relationship between MMI and financial inclusion. The study used a chi-square test at a 5% significant level to accept or reject the null hypothesis at a given degree of freedom.

4.6.1 Hypothesis Testing

The hypothesis to be tested using the chi-square test is:

H_0: There is no relationship between mobile money interoperability and financial inclusion in Ghana.

H_1: There is a relationship between mobile money interoperability and financial inclusion in Ghana.

4.6.2 Results

The Chi-square test results are as shown in tables 5 and 6 below.

Table 5: *Account-to-Account Interoperability Chi-square results*

	Value	df (degree of freedom)	Asymptotic Significance (p-value)
Pearson Chi-Square	337.000	2	0.000

Table 6: *Wallet to Account Interoperability Chi-square results*

	Value	df (degree of freedom)	Asymptotic Significance (p-value)
Pearson Chi-Square	152.376	2	0.000

Since the p-value was less than the significance level of 0.05 using a 95% confidence level, it indicated that the evidence which the data provided was strong enough to reject H_0, which says that there is no relationship between mobile money

interoperability and financial inclusion in Ghana. It concluded that there is a relationship between mobile money interoperability and financial inclusion in Ghana.

4.7 Mobile Money Regulation

4.7.1 Descriptive Statistics

Table 7 below shows the summary of the secondary data variables involved in this study. In total, eight variables were observed for each variable in the study, with mobile money regulation observing only two variables.

Table 7: *Summary Statistics for Secondary Data*

Variable	Observations	Standard Deviation	Mean	Median	Min	Max
Registered Accounts Ratio	8	0.39	0.590	0.582	0.145	1.094
Distribution/Agent Networks	8	143,829.71	145,855.50	108,258	8,660	369,599
Education Index	8	0.011	0.548	0.550	0.530	0.563
Gross Domestic Product ($)	8	251.57	2001.19	1998.48	1587.56	2345.393
Bank Penetration	8	113.51	583.26	575.05	455.46	750.50
Mobile Money Regulation	2	1.41	90.167	90.167	89.17	91.17

4.7.2 Correlational Matrix

Table 8 below presents information on the correlation between the independent variable. The correlational matrix determines if the independent variables are independent of each other by testing whether there is a perfect correlation between the variables.

Table 8: *Correlational Matrix*

	Education Index	*GDP per capita (current US$)*	*Bank Penetration %*	*Registered Agents (Cumulative)*
Education Index	1			
GDP per capita (current US$)	0.466	1		
Bank Penetration %	0.7486	0.2326	1	
Registered Agents (Cumulative)	0.7933	0.3775	0.9384	1

From table 8 above, none of the independent variables has a perfect correlation; therefore, the independent variables are independent of each other.

4.7.3 Regression

Table 9: *Regression Results*

Regression Statistics	
Multiple R	0.994770862
R Square	0.989569069
Adjusted R Square	0.963491741
Standard Error	0.073869146
Observations	8

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	1.035330917	0.207066183	37.94748727	0.025873675
Residual	2	0.010913301	0.005456651		
Total	7	1.046244219			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-5.3041	4.0785	-1.3005	0.3231
Education Index	9.7287	8.3183	1.1696	0.3627
GDP per capita (current US$)	-0.0002	0.0001	-1.2061	0.3511
Bank Penetration %	0.0004	0.0018	0.2154	0.8494
Registered Agents (Cumulative)	0.0000	0.0000	1.1109	0.3823

Table 9 above provides information on the results of the regression. The registered accounts ratio was the dependent variable, and the independent variables were Education Index, GDP per capita, Bank Penetration and Registered Agents. The variable for regulation was omitted due to a lack of data.

From the regression results, the R square and the adjusted R square are 98.9% and 96.3%, respectively. An adjusted R square of 96.3% means that the independent variables explain 96.3% of the variation in the dependent variable. Significance F has a value of 0.02587. With a confidence level of 5%, the significance value is less than the confidence level of 5% or 0.05, and this means that the regression model is statistically significant.

CHAPTER 5: CONCLUSION

This chapter presents the summary of the findings of the research, the conclusion, and the recommendations of this study.

5.1 Summary

Mobile money services have the potential to drive greater financial inclusion by providing access to financial services to the unbanked population. This study aimed to examine: (1) the extent to which mobile money regulation has improved financial inclusion in Ghana; (2) the extent to which mobile money interoperability has improved financial inclusion in Ghana and (3) the challenges facing the use of mobile money services in Ghana.

The study adopted a quantitative method and used secondary data to address the first research objective and primary data to address the second and third research objectives. Primary data was gathered through an online questionnaire from 337 respondents.

A summary of characteristics revealed that the majority of the respondents were male, about 64% of the respondents were between the ages of 18-29 years old, over 90% of respondents had attained tertiary education, and the majority of respondents were either students or employed. In terms of insights on mobile money, 95% of respondents owned a mobile money account, about 59% had their mobile money account with MTN Ghana, majority of the respondents owned just one mobile money and have been using it for 4-7 years. 89% of the mobile money users reported having used mobile money interoperability (account-to-account interoperability), and 66% reported having used

wallet to account interoperability. About 70% of the respondents reported that they had experienced some form of challenge with the use of mobile money services, with the majority experiencing network challenges.

The relationship between mobile money interoperability and financial inclusion in Ghana was tested using the Chi-Square test. The Chi-Square test results established that the p-value was less than 5%; hence the null hypothesis that there is no relationship between mobile money interoperability and financial inclusion was rejected.

Results from the regression revealed that, other than the regulatory variable, the independent variables explain 96% of the variation in the dependent variable. This implies that regulation accounts for about 4% of the variation in the dependent variable. A significance F value of 0.02587 revealed that the regression model is statistically significant.

5.2 Conclusion

The first objective of this study aimed to examine the extent to which mobile money regulation has improved financial inclusion in Ghana. From the findings, mobile money regulation explains/accounts for 4% in the variation of the dependent variable. This implies that, although a change in the regulatory guidelines may have contributed to an increase in the adoption of mobile money in Ghana, however, regulation alone does not have the greatest impact on the increase in financial inclusion in Ghana.

The second objective aimed to examine if there is a relationship between mobile money interoperability and financial inclusion in Ghana. The Chi-Square results revealed that there is a relationship between mobile money interoperability and financial inclusion.

The final objective aimed to examine the challenges faced in the use of mobile money services. Responses from the respondents revealed that the majority of respondents had experienced some form of challenge in the use of mobile money services.

5.3 Recommendations

Findings from this study revealed that there were two respondents who did not own a bank account or a mobile money account. This reveals that there are still people out there who do not have access to financial services and are still relying on cash to perform financial transactions. Therefore, it is important for mobile money operators and the government to educate these individuals on the benefits of owning either a mobile money account or an account with a financial institution.

In terms of the mobile money services used by respondents, the majority of respondents use their mobile money accounts to send and receive money or buy airtime and bundles. It is evident that the other mobile money services available to users are not being utilized. Therefore, mobile money operators should raise awareness of the numerous services available to users, such as accessing short-term loans or contributing to savings and investments.

In terms of mobile money interoperability, some of the respondents reported that they did not have any use for the interoperability, and a number of respondents were not aware that mobile money interoperability was available. Therefore, the government of Ghana, in conjunction with mobile money operators, should raise awareness on the benefits of mobile money interoperability to get more people to use it.

Finally, the majority of the respondents reported having challenges with the mobile network when performing mobile money transactions. Some users reported not being able to utilize the interoperability technology due to these challenges. Therefore, mobile money operators should do their best to improve the quality of their services so that more people can make use of the available services.

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Appendices

Appendix 1: Questionnaire

1. After fully reading and understanding the statement above, are you willing to participate in the survey?

    A. Yes

    B. No

2. If no, why?

    Enter your response

3. What is your gender?

    A. Male

    B. Female

4. What is your age range?

    A. 18-29

    B. 30-39

    C. 40-49

    D. 50-59

    E. Above 60

5. What is your highest level of education?

    A. No formal education

    B. Primary

    C. Junior High School

    D. Senior High School

    E. Tertiary

6. What is your employment status?

    A. Student

    B. Employed

    C. Self-employed

D. Unemployed

E. Retired

F. Unable to work

7. Do you own a bank account?

A. Yes

B. No

Mobile money services

8. Do you own a registered mobile money account?

A. Yes

B. No

If "No" answer Question 9, if "Yes" skip to Question 10

9. Are there any reasons for not owning a mobile money account? (Select all that apply & Skip to Question 19)

A. I do not have any use for mobile money services

B. Mobile money services are difficult to use

C. I prefer using cash

D. Using mobile money is expensive

E. Mobile money services are not safe

F. I lack the necessary documentation to register for a mobile money account

Other (Please specify) _____

10. Which mobile money provider are you registered with? (Select all that apply)

A. MTN Mobile Money

B. Vodafone Cash

C. AirtelTigo Money

11. How long have you been using mobile money?

A. Less than 1 year

B. 1-3 years

C. 4-7years

D. 8-10 years

D. More than 10 years

12. What do you use your mobile money account for? (Select all that apply)

A. Send and/or receive cash

B. Buy airtime and/or internet bundles

C. For loans/borrow money

D. Pay bills (Utilities, TV & Entertainment, School fees etc.)

E. Pay for transactions (purchasing goods, paying for transportation etc.)

F. Receive salary/allowance

G. Contribute to savings, investment, or pension

13. How often do you use mobile money services?

A. Less than 3 times a week

B. 3-7 times a week

C. More than 7 times a week

Mobile money interoperability

14. Have you used ever your mobile money account to send money to another user on a different mobile money network before?

A. Yes

B. No

If "Yes" answer Question 15, if "No" skip to Question 17

15. Which mobile network(s) did you send the money to? (Select all that apply)

A. From MTN to Vodafone

B. From MTN to AirtelTigo

C. From Vodafone to MTN

D. From Vodafone to AirtelTigo

E. From AirtelTigo to MTN

F. From AirtelTigo to Vodafone

16. How often do you send money to mobile money users on a different mobile network?

A. Less than 3 times a week

B. 3-7 times a week

C. More than 7 times a week

17. Are there any reasons why you have never used your mobile money account to send money to another user on a different mobile money network before?

A. I am not aware that I can send money to users on a different mobile network

B. I do not have any use for sending money to users on other mobile networks

Other (Please specify) _____

18. Have you used ever received money in your mobile money account from another user on a different mobile money network before?

A. Yes

B. No

If "Yes" answer Question 19, if "No" skip to Question 21

19. Which mobile network(s) did you receive the money from? (Select all that apply)

A. From Vodafone to MTN

B. From AirtelTigo to MTN

C. From MTN to Vodafone

D. From AirtelTigo to Vodafone

E. From MTN to AirtelTigo

F. From Vodafone to AirtelTigo

20. How often do you receive money from mobile money users on a different mobile network?

A. Less than 3 times a week

B. 3-7 times a week

C. More than 7 times a week

21. Are there any reasons why you have never received money in your mobile money account that was sent from another user on a different mobile network before?

A. I am not aware that I can receive money from users on other mobile networks

B. I do not have any use for receiving money from users on other mobile networks

Other (Please specify) _____

22. Do you own a bank account and a mobile money account?

A. Yes

B. No

If "Yes" answer Question 23, if "No" skip to Question 29

23. Have you ever used your mobile money account to transfer money directly to your bank account before?

A. Yes

B. No

24. Are there any reasons why you have never transferred money from your mobile money account to your bank account before?

A. I am not aware that I can transfer money from my mobile money wallet to my bank account

B. I do not have any use for it

C. Other (Please specify) _____

25. How often do you transfer money from your mobile money account to your bank account?

A. Less than 3 times a week

B. 3-7 times a week

C. More than 7 times a week

26. Have you ever transferred money directly from your bank account to your mobile money account before?

A. Yes

B. No

27. Are there any reasons why you have never transferred money from your bank account to your mobile money account before?

A. I am not aware that I can transfer money from my bank account to my mobile money wallet

B. I do not have any use for it

C. Other (Please specify) _____

28. How often do you transfer money from your bank account to your mobile money account?

A. Less than 3 times a week

B. 3-7 times a week

C. More than 7 times a week

Challenges with using mobile money

29. Have you encountered any challenges since you started using mobile money services?

A. Yes

B. No

If "Yes" answer Question 26, if "No" skip to the end

30. Which challenge(s) did you encounter in the use of mobile money? (Select all that apply)

A. Network failure

B. High transaction costs

C. Difficulty using the mobile money application/system (USSD)

D. Low daily transaction limit

Other (Please specify) _____

The End

Thank you so much for you time and the information provided.

31. If you are interested in the results of this study, kindly provide your email address.

Email address: _____