OPPORTUNITIES AND CHALLENGES OF MOBILE MONEY INTEROPERABILITY IN MALAWI

MSc. (INFORMATICS) THESIS

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MSc. (INFORMATICS) THESIS

By

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Thesis submitted to the Department of Computer Sciences, Faculty of Science, in partial fulfilment of the requirements for the degree of Master of Science (Informatics)

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DECLARATION

I declare that this thesis is my original work, unaided and has not been presented for an award for any degree or examination in any university. It is being submitted in partial fulfilment of a degree in Master of Science (Informatics). Where other people's work has been used there is proper acknowledgement to that effect.

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CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval

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To my lovely children, Yamikani and Constancia and to my sister, Mwayiwawo.

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ABSTRACT

Mobile Money technology has revolutionised Mobile Money Interoperability (MMI). To date, there is limited knowledge on specific opportunities and challenges of MMI. Preliminary research has revealed that Malawi experienced dawdling movements towards the adoption of MMI and agent level interoperability has not been achieved yet. The study therefore explored the opportunities and challenges of MMI platforms that enhance or hinders the adoption of mobile money transfer across mobile money service providers, including banks in Malawi using a combination of Technology Acceptance Model (TAM) and Technology Organization Environmental (TOE) with some modification to guide the research. An exploratory concurrent triangulation mixed research approach was utilised and data was collected from purposefully selected mobile money users, agents and employees of Mobile Network Operators (MNOs) and banks in Blantyre and Limbe. The research findings also showed that Malawi adopted MMI in 2014 with Airtel Money as the pace setter. However, most users in Malawi are not aware of the existence of the innovation. The research revealed that Mobile Network Operators (MNOs), financial institutions, mobile money users and regulatory authorities are the perceived key players for the adoption of MMI while platform provider and mobile money agents, retailers and billers are not. The current mobile money platforms are negatively affecting 'Usability' and 'Accessibility' of mobile money services and that MMI may create both positive and negative network effects for mobile money business. The research recommends for a need to fully adopt MMI, propose regulatory authorities to advance viable commercial model options for interoperability solution as it will help unveil the barriers towards the adoption of MMI. This will allow the nation to benefit from the untapped opportunities of mobile money interoperability.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACL	Access Communications Limited
AfDB	Africa Development Bank
ATM	Auto Teller Machine
A2A	Account-to-Account
DSTv	Digital Satellite Television
DV	Dependent Variable
CGAP	Consultative Group to Assist the Poor
FHI 360	Family Health International 360
FAO	Agriculture Organization
GSMA	Groupe Spéciale Mobile Association
ICT	Information Communication Technology
ITU	International Telecommunication Union
IDT	Innovation Diffusion Theory
IV	Independent Variable
MACRA	Malawi Communications Regulatory Authority
MFI	Macro Finance Institution
MGDS	Malawi Growth and Development Strategy
MNO	Mobile Network Operator
MMO	Mobile Money Operators
MMI	Mobile Money Interoperability
NSO	National Statistical Office
NBM	National Bank of Malawi
OIBM	Opportunity International Bank of Malawi
Platform	Hardware and software that enables provision of a mobile money service
RBM	Reserve Bank of Malawi
SME	Small and Medium Enterprises
SMS	Short Message Service
SIM	Subscriber Identity Module
TAM	Technology Acceptance Model
TNM	Telecom Networks Malawi
TOE	Technology Organization – Environment
USAID	US Agency for Development

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This research explored the opportunities and challenges of mobile money interoperability in Malawi. This chapter provide details on the following areas: various definitions of mobile money, background of interoperability of mobile money and their roll out in Malawi and various countries in the world, research problem that focuses on financial inclusion leveraging on interoperability of mobile money platforms, research objectives, research motivation and the structure of this thesis.

1.2 Introduction to Mobile Money

Electronic commerce and mobile commerce are evolving, providing new ways of conducting business that present both opportunities for improvement and potential problems (Stair &. Reynolds, 2010). Among other developments is the introduction of mobile money technology. Mobile money technology has also given birth to revolutions where banking has been simplified and is reaching a wider population of mobile phone users. One such development is the introduction of mobile money interoperability (MMI).

Mobile money, also referred to as mobile payment (RBM, 2011) or mobile wallet, basically involves money transfer from one person to another, using mobile phone application. According to Ndiwalana, Morawczynski and Popov (2010), mobile money is a term used loosely to refer to money stored using the Subscriber Identity Module (SIM) as an identifier as opposed to an account number in the conventional banking sense. The World Bank (2014) (Gutierrez, E. and Choi, T., 2014) classified mobile money as payment services operated and performed from a mobile device such as mobile phone and is further clarified as the intersection of both banking and telecommunications services. While the Groupe Spéciale Mobile Association (GSMA)

define mobile money as service in which mobile phone is used to access financial services, World Bank country director for Kenya, Johannes Zutt, defined the term as electronic money accounts that can be accessed via mobile phone (Zutt, 2010). Mobile money offers secure and convenient means for the banked and unbanked people, to send and receive money with mobile phones, anywhere at any time.

Mobile money is distinct from mobile banking; Mobile banking refers to a situation where a bank account holder is able to transact via commands from a mobile platform, whereas mobile money account holders do not require an account at a bank. According to International Telecommunication Union (ITU), mobile banking allows customers to use their mobile phones as another channel for their banking services, such as deposits, withdrawals, viewing of statements, account transfers, bill payments and balance inquiries (ITU, 2003). Customers require an account at a bank to access mobile banking services as they are value adding to the tradition banking products (The Daily Times, 2017). Mobile banking works closely with Mobile Network Operators (MNOs) to provide banking services to bank customers who are also subscribers of MNOs. Several banks in Malawi, namely: National Bank of Malawi (NBM), Standard bank, FMB Bank, NBS Bank and FDH Bank, have adopted mobile banking services (NBM, 2010; FMB, 2010; FDH Bank 2017; STD Bank, 2017; NBS Bank, 2016; SEEP, 2009). M-banking is a service available through mobile money that has been the potential to bring basic banking and electronic services to unbanked consumers (Anderson, 2010).

According to GSMA (2015), state of the industry report on mobile money, there were over 271 live mobile money deployments in 93 countries in the world by 2015, with each operator processing an average of 33 million transactions a day. As the Sustainable Development Goals (SDGs), also known as the Global Goals, entered their third year in 2017, mobile technology also proved to be an essential tool for delivering on this highly ambitious agenda (GSMA, 2017). Mobile money technology contributes to 13 of the 17 SDGs; from enabling access to essential services like health and education, empowering women with employment opportunities and reducing poverty by offering life-enhancing financial services.

In Malawi, mobile phone is regarded as an ideal platform to increase outreach of financial services to the unbanked and the under banked as their penetration is already large and growing. Over the years, the country has experienced low banking penetration

levels making it impossible for banking services to be available to all the population. Mobile phone subscriptions are increasing on a yearly basis with the emergence of new trends in mobile telephony. The growth in mobile phone subscriptions has positively contributed to the growth in people subscribing to mobile money services. Despite this growth, the 2014 Access and Usage of ICT Services Survey that was commissioned and financed by MACRA but supported by a technical working committee comprising of NSO and MACRA, reported that most users (61.1 percent) of mobile money services in Malawi, as illustrated in figure 1.1, have a single active SIM card and mobile wallet respectively. Mobile banking and mobile money payments therefore pose some significant challenges on usability and accessibility which in turn may have an effect, not only on transaction levels, but also on addressable market size for mobile money on the part of Mobile Money Operators (MMO) and the adoption of mobile money technology by users (GSMA, 2013). The National Statistical Office (2014) study was driven by the lack of reliable and up to date data on absorption and usage of ICT services that would reliably inform the implementation of the Malawi Growth and Development Strategy II (MGDS II).

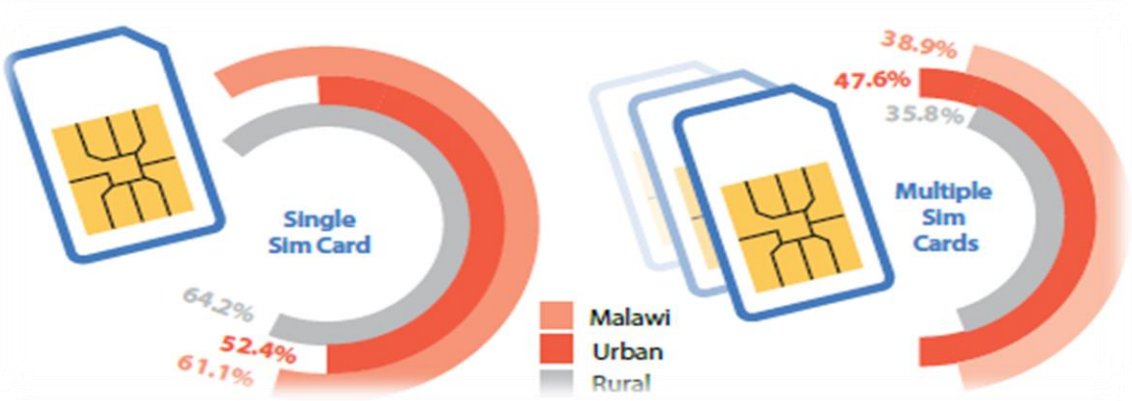

Figure 1.1: Number of active SIM cards per individuals by geographical location (Source: National Statistical Office, 2015)

1.3 Background to Mobile Money Interoperability

To mitigate the challenges associated with usability and accessibility of mobile money services, a growing number of mobile money operators in mobile money service markets, including Malawi, have shown interest in the development of Mobile Money Interoperability (MMI) solutions. The term 'Interoperability' literally means the ability

of systems to share data and operate reciprocally. It is the ability of diverse systems and organisations to work together. Africa Development Bank (AfDB) describe 'Interoperability' as a means that the mobile payment providers, financial institutions and network operators use for interaction with each other (AfDB, 2012). According to Gillis and Pillay (2012), the term is often used in a technical systems engineering sense. Jack and Suri (*n.d.*) defined the term as the ability of two or more systems or applications to exchange information and to mutually use the information that has been exchanged. Interoperability in the context of mobile money means Mobile Money Operators (MMOs), providing the ability for customers to undertake money transfers, between two accounts at different mobile money schemes, alongside the ability to transfer money, between accounts at mobile money schemes and accounts at a bank (GSMA, 2014). This paper summarily describes MMI as the ability of users of different mobile money schemes to transact directly with each other and the ability of the users to directly transact with banks. Where MMI does not exist, mobile money services allow users to send money to non-users (who receive the money in a form of cash from an agent. Interoperability will therefore play a key role in the continued expansion of mobile money (EseryGlobal, 2015).

1.4 Mobile Money Interoperability in the World

Preliminary research revealed that on a global scale, mobile money interoperability is still in its infancy and has only taken place in a handful of markets. Mobile Network Operators (MNOs) in Pakistan, Sri Lanka, Indonesia and Tanzania are considered as pioneers to interconnect their mobile money services in the world between 2013 and 2014 (GSMA, 2014). MNOs in Madagascar, Rwanda and Thailand followed suite and interconnected their services in 2015, whereas operators in Philippines interconnected their services in 2016. Additionally, mobile money services in Bolivia, Peru and Mexico, which were already interoperable with the banking sector, interconnected their services to full account-to-account (A2A) interoperability in 2017. Most of these interoperability agreements were as a result of the initiative of the GSMA and central banks in making mobile money services more inclusive and accessible to more people (Estopace, 2016).

In the southern Africa region, Tanzania is considered to be one of the most successful cases of mobile money interoperability. The case remained different for Malawi as the

adoption delayed. However, at the time of writing this report, both TNM Mpamba and Airtel money got connected to some financial institutions and they had also interconnected their services.

1.5 Mobile Money Interoperability in Malawi

Airtel Malawi and TNM Plc (MNOs) launched Airtel Money (or 'Khusa M'manja') on 29th February, 2012 and TNM Mpamba on 2nd May, 2013 respectively. The two mobile money schemes, TNM Mpamba and Airtel Money, enable users to transfer money (remittances), cash in and out transactions. Customers use Airtel money and TNM Mpamba to buy airtime for mobile phones, salary payments, make payments and pay for insurance services. Mobile money services have also been used in social cash transfer programmes. However, for some years after Malawi adopted mobile money technology, it was still not possible for customers to send or receive money to or from one scheme to another and banks. The year 2015 saw Malawi launching a mobile money interoperability network of agents through Zoona, a third mobile money service provider.

As Airtel Malawi and TNM plc continue to invest in growing their mobile money operations, they are exploring a variety of methods to expand this growth, including partnership arrangements with banks and Microfinance Institutions (MFIs).

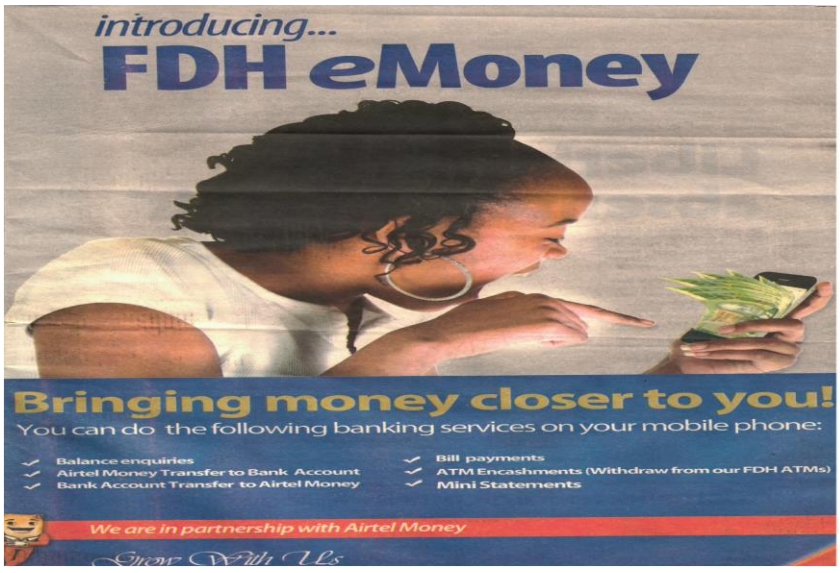

Figure 1.2: Airtel Money and FDH bank partnership launch

(Source: Nation News Paper, September, 2014)

As shown in figure 1.2, Airtel Malawi partnered with FDH Bank in September, 2014 where customers on Airtel money could inquire account balances using their phone, send money directly from their wallets to an account at FDH bank, transfer money directly from an account at FDH bank to their wallet, make bill payments, withdraw money from their wallet using any FDH bank Auto Teller Machine (ATM) (The Nation News Paper, 2014). In March, 2016, the partnership between Airtel money and FDH Bank introduced another MMI enabled service, where by, registered Airtel Money customers could borrow money from the bank through their mobile phone (The Daily Times, 2016).

TNM Plc interconnected their mobile money service, TNM Mpamba, with FMB bank in July, 2017 as illustrated in figure 1.3. The service allows any TNM customer with an active Mpamba account to withdraw money directly from their mobile wallet using any FMB bank ATM.

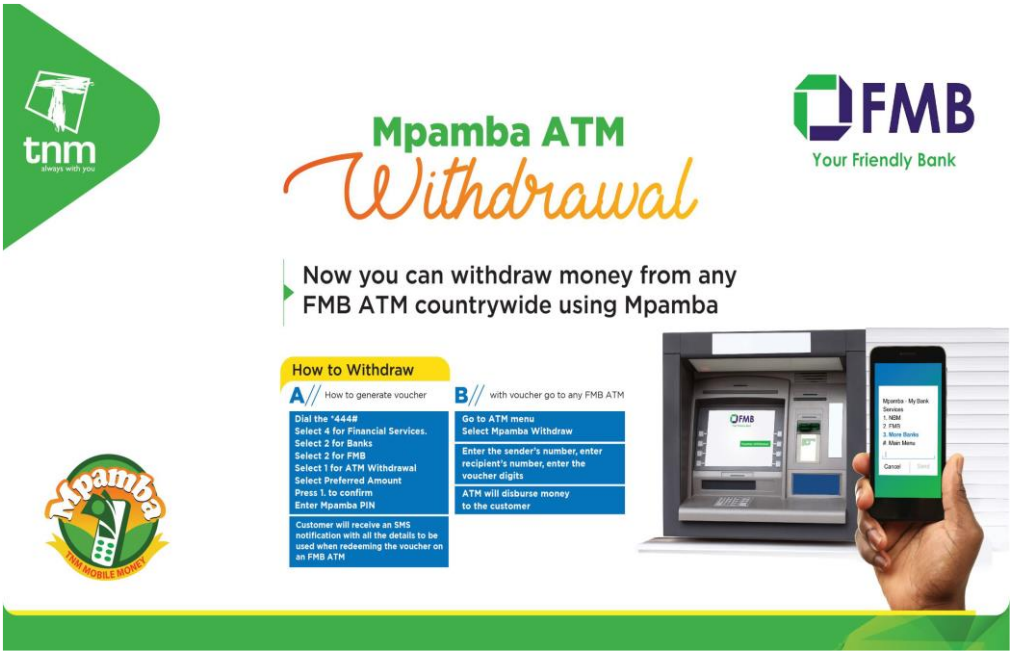

Figure 1.3: TNM Mpamba and FMB bank interoperability partnership launch (Source: Field data, 2018)

Traditionally, Mobile money users in Malawi could only do a cash out transaction through mobile money agents. The introduction of the new service allows TNM Mpamba customers to: self-generate vouchers which they could use at any FMB bank ATM, reverse a voucher if necessary and allows non registered Mpamba customers to

withdraw cash at the ATM whenever the voucher is sent from a registered TNM Mpamba user. This entails that a voucher can be redeemed by any customer regardless of whether the customer is registered on TNM Mpamba or not, and whether or not the customer has an FMB bank account. In so doing, both FDH bank and FMB bank ATMs therefore became the next batch of agents where cash could be withdrawn across Malawi. The service has expanded Airtel Money and TNM Mpamba network of agents.

In the year 2018, Malawi experienced the flourification of banks versus Mobile Network Operators (MNOs) mobile money interoperability services. The first to launch their MMI in 2018 was TNM Mpamba which interconnected their services with National Bank of Malawi (NBM) in June, 2018, followed by the partnership between TNM Mpamba and FDH bank in August, 2018. In October, the same year TNM Mpamba interconnected their service with Finca, a micro finance institution offering deposit taking banking services. These bank - MNO partnerships enabled mobile money users to move funds from an account at a bank, to their mobile wallet or from their mobile wallet to an account at a bank. Figure 1.4 illustrates the unveiling of TNM Mpamba and banks' partnerships.

Figure 1.4: TNM Mpamba and banks partnership launch

(Source: Field data, 2018)

Towards the end of 2018, Malawi saw the launch of interconnection between Airtel Money and TNM Mpamba. The initiative allows registered customers from either Airtel money or TNM Mpamba, to transfer money to or from their mobile wallet directly without using mobile money agents.

1.6 Background to the problem

The integration between MNOs and banks is happening, as more than 40 percent of participants in the 2015 GSMA Global Adoption Survey of Mobile Financial Services reported that they are now offering a bank-to-wallet or wallet-to-bank product. Reporting on the impact of Mobile Money Interoperability, the GSMA (2016) indicated that "Interoperability, in its broadest form, contributes to digitising cash in the ecosystem, increasing efficiency of payment systems, and improving financial inclusion by bridging the gap between banked and unbanked consumers. Interoperability will therefore continue to be a strategic priority for mobile money business in the world". Mobile money providers are committed to ensure services are interoperable with relevant financial services and payments providers, including banks and other mobile money providers.

The Reserve Bank of Malawi (RBM) Vision and Strategy explicitly specified that all payment system facilities in Malawi should conform to open standards in order to attain interoperability. According to RBM (2011), mobile money service providers are responsible for securing interoperability of their systems and operate in the interest of the public. However, the 2010 - 2014 National Strategy for Financial Inclusion, a United Nations Capital Development Fund blueprint for least developed countries, cited 'lack of interconnectivity' as one of the challenges hindering full achievement of financial inclusion in Malawi. Lack of interconnectivity between Mobile Money Operators (MMO) and players in the financial sector has also an effect on the nation payment system. Following this, international organisations have taken a lead in helping to extend the reach of mobile money services in Malawi, such as the MM4P, US Agency for Development (USAID), the World Bank and Family Health International 360 (FHI 360).

While mobile money interoperability is a great achievement, additional gains to be achieved from this may be fully realised once mobile money services in Malawi is

interoperable at the mobile agent level. This will allow for all users of mobile money to have access to all the mobile agents in the country for cash-in and cash-out transactions. Agent interoperability may therefore not only benefit the agents but also mobile money users and service providers as well.

Most studies conducted on mobile money interoperability have not been specific to Malawian environment. Many of the available literature is on studies conducted in countries like Kenya, Tanzania and elsewhere in Africa and outside Africa.

1.7 Research Problem

As much as there have been a number of studies on mobile money in Malawi and in other countries in Africa, none of those studies specifically investigated opportunities and challenges that enhance or hinders the adoption of mobile money interoperability in Malawi. This clearly shows that there is a glaring gap in knowledge about specific opportunities and challenges of Mobile Money Interoperability (MMI) which may have contributed to the dawdling movements towards banks and mobile money operators' interoperability and interoperability across network money transfer in Malawi.

Currently, MMI at the mobile money agent level has not been achieved in Malawi. Mobile money agents are required to sign a contract with each operator that they serve as well as maintain separate electronic float accounts. And for a number of years, mobile money users in Malawi could not directly transact money between the different mobile money service providers seamlessly. Although the money would finally be accessed, one had to visit multiple agents to make the transactions with different networks and had to cash out or in, each of which was subjected to transaction fees.

1.8 Contribution to the body of knowledge

The research was worth scientific investigation in the sense that it generated knowledge that would fill the knowledge gap of specific opportunities and challenges of mobile money interoperability technology that enhance or hinders the adoption of mobile money transfer across mobile money service providers, including banks in Malawi.

Firstly, knowledge generated will significantly inform MNOs, regulatory authorities and those who work towards promoting the adoption of mobile money interoperability

about specific areas that needs to be looked into to ensure that Malawi fully benefits from the opportunities of MMI.

Secondly the research will provide an insight to different stakeholders with special interest in mobile money services of the ongoing changes taking place in the mobile payment sector, as well as on how mobile application computing contributes to the delivery of financial services. The study will also inform future developments of interoperability of mobile money transfers in Malawi.

Finally, the study findings will support government and regulatory authorities in formulating policies that will promote the adoption of mobile money interoperability, as well as policies that will assist in mitigating the impact of the identified challenges of mobile money interoperability.

1.9 Research Objectives

The main research objective was to explore opportunities and challenges of Mobile Money Interoperability platforms that enhance or hinders the adoption of mobile money transfer across mobile money service providers, including banks in Malawi. In order to draw well-thought conclusions for the study, the research was guided by the following specific objectives:

1.8.1 To identify the current status of Mobile Money Interoperability platforms in Malawi.

1.8.2 To examine how existing mobile money platforms affect accessibility and usability of mobile money services – demand side analysis

1.8.3 To explore opportunities and challenges of Mobile Money Interoperability platforms to providers and enabling institutions - supply side analysis.

1.10 Thesis Structure

This thesis contains five chapters. Chapter one provides an introduction to the thesis. The chapter presents introduction to mobile money services in general, background to mobile money interoperability, history of mobile money interoperability in the world and in Malawi, background to the research problem and the research problem, research objectives and contribution to the body of knowledge.

Chapter two presents literature review that focuses on what other researchers and scholars have done regarding mobile money and MMI. The chapter outlines the key players in mobile money ecosystem. It discusses the types and levels of MMI, factors influencing the adoption of MMI and the effects of MMI. The literature review chapter also presents the theory and conceptual framework that foregrounded the study.

Chapter two is followed by chapter three which presents the research methodology. It looks at how the research was designed and carried out in order to meet the set objectives. It discusses the research setting, research approaches, design, population, sample size, sampling techniques and procedures, data collection methods and tools, and data analysis methods and processes.

Chapter four presents and discusses the findings of the research. The chapter presents the primary data which was collected from the field. Theories in literature review of chapter two are then discussed in relation to the research findings of chapter four. The chapter concludes with a report on opportunities and challenges of MMI platforms.

Finally, chapter five concludes the thesis by reflecting on the research objectives and how they were met. The conclusion also gives pointers to further research work emanating from this research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter makes a discussion of available literature and related studies conducted with a rationale of exploring research works as well as useful secondary data related to the study. The chapter explores what other researchers and scholars have done on mobile money and MMI. It discusses the impact of mobile money, outlines the key players in mobile money ecosystem, discusses the types and levels of MMI, factors influencing the adoption of MMI and the effects of MMI. Finally, the chapter reviews the research theory and conceptual framework used in this research in order to understand the opportunities and challenges that enhances or hinders the adoption of MMI.

2.2 The Impact of Mobile Money

Literature has shown that a more inclusive financial system is critical to the social and economic development of a country (Kadale, 2010). The Government of Malawi also recognizes that financial inclusion is one of the means to uplift the living standards of the poor and disadvantaged people. This section therefore discusses the impact of mobile money in developing countries.

Electronic money in general and mobile money in particular presents an opportunity to empower large segments of the population by providing access to finance through open-access ecosystems enabled by mobile telecommunications networks (USAID, 2011). Some studies reveal that mobile money has proved to be a scalable method to provide financial services in developing countries. This argument can be verified with data from several African countries including the work of Must and Ludewig (2010). Several reasons have contributed to this state including easier and more affordable ways to send remittances, increasing the reach and affordability of micro-loans, decreasing costs of

savings among other services that are required by SMEs (Nyaga, 2013). However, Nyaga (2013) recommends awareness campaign on the services offered by the mobile money services and further studies on the causes of the inconvenience associated with mobile money and reasons why mobile-bank services (accessing bank account via mobile phone) are not popular among SMEs.

Global research on mobile money has focused on the impact of mobile money in developing countries revealing that access to financial services through mobile money leads to poverty reduction and financial inclusiveness (Must and Ludewig, 2010). According to World Bank (2012), increased mobile phone penetration in developing countries is correlated with a 0.8 percent increase in economic growth. Mobile money penetration has therefore had its own contribution especially in relation to financial inclusiveness. Considering that there are over 100 deployments of mobile money systems in developing countries, with around half in Africa alone, the service has a clear target population (World Bank, 2012).

Mobile money has developed a wide range of services that can be used to benefit users in different ways. The services offered through mobile money in Malawi allow users to benefit from a variety of financial services and transactions. According to InterMedia (2010) a majority of subscribers (99 percent) only use mobile money service to send or receive money; the remaining 1 percent use it for additional services including arranging for loans or credit.

Recent research (Donovan, 2011; Nyaga, 2013) shows that Mobile money impacts individuals and households in various ways. Donovan (2011) looked at M-Pesa in Kenya in an attempt to find out the impact it had on human freedom. He concludes that a relationship of networks of social interactions, the need and desire to coordinate financially with friends, relatives and businesses, and progressive desertion of other alternatives like banks and Western Money Union lead to a form of power that acts on all Kenyans both users and non-users of M-Pesa. In addition, mobile money significantly impacts on the ability of a household to spread risks as a result of reduced transaction costs compared to households without mobile money who are likely to suffer a drop in consumption when hit by a negative income shock (Jack and Suri, 2011).

In conclusion, Mobile phones can serve as a tool for economic development. They can improve consumer and producer welfare and larger economic development in developing countries, but the impact of m-money systems on microeconomics and macroeconomics outcomes is a rich area of research (Jenny & Mbiti, 2010).

2.3 Players Involved in Mobile Money Ecosystem

Mobile money business involves different stakeholders. The table 2.1 below discusses typical mobile money players and stakeholders who play different roles or derive diverse benefits from the whole mobile money ecosystem as outlined by UNCTAD (2012).

Table 2.1: Players involved in mobile money ecosystem

Stakeholder	**Role**
Mobile Network Operator (MNO)	• Licensed and comply with the country's telecommunication regulations and policy. • Provide mobile infrastructure and customer base.
Financial Institution (Banks and MFIs)	• Licensed and comply with the country's financial regulations. • Have infrastructure that enables money exchange between different parties. • They provide physical custody of cash.
Regulatory Institutions	• Central banks for the financial sector and telecommunication regulators for the communications sector. • Key issues regulated are: data security, consumer protection, money laundering, anti-competition practices, crimes within the sector and interoperability of technologies. • In Malawi, RBM is the sole regulator for financial matters responsible for promoting a sound financial structure, including payment systems, clearing systems and adequate financial services (RBM, 2011). • MACRA is the regulator for MNOs.
Mobile Money Agents	• People or business contracted to facilitate transactions for users. E.g. cash-in and cash-out (i.e. loading value into the mobile money system, and then converting it back again). • Provide front-line customer service e.g. teaching new users how to initiate transactions on their phone and register new customers. • They earn commissions for performing these services. The commissions are automatically deducted by the system from a

Stakeholder	Role
Mobile Money Agents	user account at the time of transaction. MNO reconciles and prefer paying agents their commission in one lump sum. • Typically, they will conduct other kinds of business in addition to mobile money. However, the kind of individuals or businesses that can serve as agents is sometimes limited by regulations. • MNOs in Malawi have developed extensive agent networks to sell airtime and other products while those of the banks tend to be limited to urban or highly populated areas. • Some industrial participants prefer the terms "merchant" or "retailer" to describe this person or business to avoid certain legal connotations of the term "agent" as it is used in other industries (GSMA, 2010).
Mobile Money Users	• These are normally subscribers to MNO's other services. • They derive benefits by getting cheaper and more efficient means of transferring or paying money to other people or businesses within the network. • Users can also be non-subscribers, who send money to subscribers.
Merchants and Retailers	• They accept mobile money payments in exchange for different products and services. In return, they minimize the need to handle cash. • They help increase demand for mobile money by offering more avenues through which users can spend their mobile money.
Deposit Taking Business	• These are businesses that utilize mobile money as a means to deliver their services, i.e. MFIs, insurance providers, financial institutions, as well as large-scale disbursers and bill issuers.
Equipment manufacturers and platform providers	• These include a wide array of stakeholders like mobile phone makers, network equipment vendors as well as application providers. • These benefit from the increased sale of end-user devices like mobile phones, equipment to handle increased network capacity and fees or subscriptions respectively. • A typical example of platform provider in Malawi is the National Switch Limited (Nat-Switch). This is a World Bank funded project aimed at interconnecting banking operations and financial transactions through Auto Teller Machines (ATMs), point of sale (POS) devices, mobile banking and e-banking (NyasaTimes, 2017)

2.4 Types of Mobile Money Interoperability

According to Kasunic (2004), also cited in Elyjoy et al (2014), interoperability is a function of operational concepts and scenarios, policies, processes and procedures in heterogeneous domains. Organizational entities that manage data are autonomous in adopting the architecture, design and communication technology. Architecture and design autonomy give them leverage to adopt any architecture/design suitable for holding the data across the organization. Communication autonomy comes into existence when organization is willing to share data with different architectures, vendors or solutions (Micheni, Muketha and Wamocho, 2014). In interoperability, element of associative autonomy has to be there to control autonomy at different level of data sharing across the organization for inter/intra communication and exchange of information (Sheth, 2015). Interoperability is categorised into different types (Lueders, 2005; Gradmann, 2008; Rowlands, 2009). The following section discusses various types of interoperability.

2.4.1 Technical Interoperability

Technical interoperability denotes the interoperability of infrastructure and software (Micheni, Muketha and Wamocho, 2014). Infrastructure interoperability is the ability of hardware to acquire different organizations to work in a connected way. It makes heterogeneous of systems a reality (Purnomosidi, 2011). Technical interoperability is associated with the hardware and software components, networks and equipment that enable machine to machine communication to take place. This includes aspects such as open interfaces, connectivity, data integration, middleware, data presentation, data exchange, accessibility and security issues (Van der VH Wiles, 2006; Ibrahim and Hassan, 2010).

2.4.2 Syntactic Interoperability

Syntactic interoperability deals with the data representation in machine readable form and usually associated with data formats (Van der VH, Anthony Wiles, 2006). Intent is to identify elements, rules for structuring the elements, mapping, bridging, and crosswalks between equivalent elements (Veltman, 2001).

2.4.3 Semantic Interoperability

Semantic interoperability helps in making two or more systems capable of communicating and exchanging data. It is concerned with ensuring that the precise meaning of exchanged information is understandable by any other application that was not initially developed for this purpose (Micheni, Muketha & Wamocho, 2014). Semantic interoperability is a must to ensure only relevant information can be exchanged or shared. It supports high level, context sensitive information request over heterogeneous information resources, hiding system, syntax and structural heterogeneity (Sheth, 2015). To achieve semantic interoperability, both sides must refer to a common information exchange reference model (Scholl, Kubicek &. Cimander, 2011).

2.4.4 Data Interoperability

Data interoperability means single data definition for all systems. Interoperability at the data level requires involvement in the development of standards for data descriptions (catalogues and reference data), data access (database interfaces), and data transport (representation and protocols) (Kasunic, 2004). The basic idea is that shared data is stored only once and maintained by the producer. In this way, data in use should be up to date and no redundant versions need to be stored (Winter, 2003).

2.4.5 Organisational Interoperability

Organisational interoperability is concerned with the ability of two or more units to provide services to and accept services from other units, and to use the services exchanged to enable them operate effectively together (Legner & Lebreton, 2007). Each organization brings its own unique culture, capabilities and operating procedures to the table. Organizational Interoperability heavily depends on successful implementation of technical, syntactical and semantic interoperability.

2.5 Mobile Money Interoperability Levels and Frameworks

The Consultative Group to Assist the Poor (CGAP) proposed a framework that allows mobile money services in one market to internetwork with each other (Kumar & Tarazi,

2012). CGAP distinguishes different levels of Mobile Money Interoperability as follows:

2.5.1 Platform-Level Interoperability

Platform-level interoperability permits customers with an account with one service provider to send or receive money to or from the account of a customer of another service provider and be able to transact business without going through agents (Kabukuru, 2010; Neil & Leishman, 2012).

2.5.2 Agent-level Interoperability

Agent-level interoperability permits agents of one service provider to serve customers of another service provider for cash-in/out services related to customer's account. This is possible even when there is agent exclusivity, as long as platforms are interconnected (such as with interoperable ATM networks (Kabukuru, 2010; Leishman, 2011).

2.5.3 Customer-level Interoperability

Customer-level interoperability permits customers to access their account through any SIM. A customer's ability to access his/her account using any phone with a SIM card on the same network; or to access multiple accounts on one SIM (Kabukuru, 2010; Kabir & Michael, 2012).

In addition to the Platform-level, Agent-level and Customer-level interoperability discussed above, Neil and Leishman (2012) proposes a framework that distinguishes between different types of interoperability frameworks as follows:

a) Interconnection with financial institutions

One mobile operator, in one country, operating its own commercially and technically independent mobile money service, interconnecting its technical platform with the technical platform of a traditional financial services provider to enable interaction between the two platforms (the ability for a customer to send money from a mobile money account to a bank account).

b) Interconnection with other payment networks

One mobile operator, in one country, operating its own commercially and technically independent mobile money service, interconnecting with a separate payment system (connecting with the Visa or MasterCard payment networks).

The above types of interoperability are consistent with the key functional requirements for Mobile Money Interoperability as highlighted by the GSMA, also cited in Esery Global (2015) as:

(a) Directly transact between wallet accounts at different MMOs.
(b) Directly transact between mobile money accounts and bank accounts.
(c) Settle the funds for transactions across schemes and between schemes and banks.
(d) Implement common risk management practices that preserve the integrity of the individual mobile money schemes.

2.6 Factors influencing the adoption of Mobile Money Technologies

An individual's choice of adoption of a payment system is as a result of certain factors. Mobile money is one example of mobile payment system (Nyirenda, 2012). This section discusses some factors that influence mobile money users to adopt innovations in mobile money technologies.

2.6.1 Customers' Wealth/Income Level

According to Yakubu (2012), wealth has an important role to play in terms of users' decisions on payment choice. Consumers' wealth may influence payment choice and the availability of payment instruments that one can choose. For instance, while wealthy consumers may be able to fund their obligations generally, consumers that experience brief financial shortfalls may not find electronic bill payment desirable as a payment instrument (Mantel, 2000). In such a situation, the consideration of the risk factor will let some consumers to avoid using pre-authorized electronic bill payment.

2.6.2 Customers' Educational Level

Users' education level may also affect the demand for mobile money payment. For example, Kennickell, Arthur and Kwast (1997) illustrates how education play an important role in determining household use of e-money products. Kwast, Arthur and Kennickell (1997) concludes that the US market for such products is still highly specialized, with the demand coming almost entirely from higher income, younger and more educated households that have accumulated significant financial assets. Educational levels of customers determine whether consumers will adopt mobile

money service or not. Studies have shown that highly-educated people patronize electronic payment products than less-educated people. The technicalities involved in some electronic payment transactions discourage less educated customers to patronize its use (Annon, 1999).

2.6.3 Employment Level

Saliu (2015) observes that employment characteristics affect the socioeconomic status of people positively or negatively. Ferguson (2000) found that people employed who receive their pay through the banks are more likely to use electronic means of payment. Employees, through their constant contacts with banks are more exposed to payment products, and are therefore likely to patronize the products. In addition, mobile money creates employment opportunities which encourages its adoption. A study by Saliu (2015) in Ghana established that MMT services has provided vendors better job satisfactory

2.6.4 Customers' Personal Preferences

Another factor influencing payment instrument choice pertains to customers' personal preferences. Yakubu (2012) identifies the following six general consumer preferences: (1) control and customer service; (2) budgeting and record keeping; (3) incentives and transaction costs; (4) convenience; (5) safety, easy and convenience; and (6) privacy and security. Nyaga (2013) found a positive correlation between SME performance and transaction cost, transactions time and convenience, and financial accessibility. Mobile money services are considerably much cheaper than other money transfer options such as Western Money Union (Omwansa, 2009). Mobile money is considered as being 19% cheaper than banks by international standards (World Bank, 2012), with low transaction costs favouring formal and informal money transfer. Mobile money is also considered liquid enough to allow for easy or fast conversion with minimal loss on value compared to other assets that SMEs might own. This proves an important element in time of crises, when money stored in mobile money can easily be converted to actual cash or used for business transaction directly without converting into cash (Nyaga, 2013). Additionally mobile money can be transacted anywhere anytime without the need to travel to an agent, unless the there is a need to withdraw or deposit cash. Even so, mobile money agents in Malawi are conveniently located in many towns. Commenting on

accessibility, Nyaga (2013) argued that mobile money has significantly increased the accessibility of financial services to the poor in Kenya.

2.6.5 Transaction-Specific Factors

Transaction-specific is another factor that influences consumer decision-making in payments. This relates to the specific nature of the payment being made, where it is being made, and how the consumer views their relationship with the merchant (Mantel, 2000). The use of a particular payment instrument may depend on the value of the bill (whether it is large or small). In addition, the availability of payment infrastructure determines the choice of payment instrument (Mantel, 2000).

2.6.6 Marketing Campaigns

Another factor that influences consumer decision-making relate to marketing campaigns. Increased use of electronic payment instruments are believed to have been achieved through large-scale consumer marketing campaigns (Yakubu, 2012). The marketing activities employed by the financial institutions are expected to aid utilities by educating consumers as to the benefits, ease of use, convenience and security of paying bills electronically (Mantel, 2000).

2.7 The effects of Mobile Money Interoperability

According to Leo Van Hove (n.d.), cited in GSMA (2014), interoperability in mobile money may create strong positive network effects. There is a wide body of research that investigates interoperability in payments systems and assesses the opportunity for participants created through network effects. Studies have found empirical evidence that demonstrates the positive network effects of interoperability between banks, which could also be applied for mobile money (GSMA, 2014).

The GSMA summarily cites three opportunities that Mobile Money Interoperability offers which are:

a. Increasing mobile money transactional revenues for MNOs by extending the e-money loop,
b. increase the addressable market size for mobile money, and,
c. grow the mobile money ecosystem with operators positioned at the centre.

The above opportunities centre on service providers. Some literature discusses the positive effects of MMI to users of mobile money services. Among them is CGAP that reported efficient services, lower prices for consumers and an accelerator of financial inclusion (CGAP, 2012). MMI increases cashless transaction volumes for a country. This has a very positive effect as it helps to reduce expenditure in printing new bank note for central banks as reported by National bank of Malawi head of strategic marketing and corporate affairs, Wilkins Mijiga (The Daily Times, 2017).

While a lot of research recognises the positive effects that Mobile Money Interoperability may create for users and service providers, other literature recognises that there are also some negative effects of the innovation of this technology. Joining an interoperable network can have negative effects due to the competitive threat of substitution, referred to as the negative effect of network externalities, as the differentiation of products on the same network becomes harder for network operators, as well as increasing costs for implementing and operating compatible systems (Clark & Camner, 2014). For telecoms and payments products alike, this leads to an incumbent networks trying to protect their existing business by remaining isolated from other networks, even though there is evidence that, if network externalities are strong, the positive effect is more valuable than the negative impact (Nicholas Economides, 1996).

CGAP cited costs, threats to competitive advantage and less profitability as some of the negative effects of MMI (CGAP, 2012). Chris Chirwa, a contributor to a feature in one of Malawi's daily newspapers, the Daily Times, reported 'Cost' as one of the challenges hindering great and exciting initiatives and innovations, including financial inclusion (The Nation, 2016). Chirwa reports that most financial services for the masses rely on technology. He further reports that one of the challenges in Malawi is the high costs of technology which includes the applications, systems and internet. Despite the prohibitive transaction limits and charges imposed by mobile money operators, mobile money have become an aspect of financial inclusion, an initiatives which the government of Malawi is driving through the Ministry of Finance and the Reserve Bank of Malawi (RBM) (The Daily Times, 2016). Since Mobile Money Interoperability is part of innovations in mobile computing, the research therefore attributes the challenge of cost as a contributing factor to the country's slow rate in adoption of MMI.

2.8 Related Literature and literature gap

There has been a proliferation of studies on adoption and use of mobile money service in Africa in the recent past. However, different countries have had different experiences regarding mobile payments (Nyirenda, 2012). Some mobile money studies that were conducted in Malawi and in other countries abroad are been outlined below, however most these studies have concentrated in demonstrating the impact of mobile money services. This section discusses some notable mobile money researches conducted in Malawi and in other countries. The section also highlight the gaps identified in the reviewed literature focusing on the opportunities and challenges of MMI.

The study by Menard Nyirenda (2012) investigated factors that affect the consumer in adopting mobile payment systems considering the availability of other payment methods in Malawi (Nyirenda, 2012). The study findings show that relative advantage, complexity, compatibility, cost, trust and security, network externalities and situational factors affect the use of mobile payment systems. In addition, personal characteristics and use of mass media play a role in the adoption of mobile payment systems. Even if the study came up with factors that affect the use and adoption of mobile payment systems in Malawi, these factors have not been looked at in the context of the use and adoption of MMI.

Using the sample drawn from a population in unbanked rural areas of Malawi, Mtambalika et al., (2016) conducted a study that attempted to answer the question on whether branchless banking can be used to reach the unbanked and underbanked rural areas in Malawi. This was done considering Africa and other developing countries where mobile phone banking is employed as a principal channel to reach out unbanked and under banked rural areas. Unfortunately, instead of commercial banks taking a leading role in the provision of banking and financial services to rural areas, network operators are the ones leading. Although network operators lead in the provision of mobile phone financial services, they do not have banking license as a result; they offer limited financial services to rural areas. The results show that branchless banking is feasible in the unbanked rural areas in Malawi. Although the study alluded to the provision of banking and financial services to rural areas leveraging on mobile money, it does not specifically mention about MMI.

Recognising that E-commerce is enjoying wide recognition in many countries but its adoption in developing countries is still a challenge, Saidi (2010) researched on 'towards a faultless mobile commerce implementation in Malawi'. He finds banks and mobile network providers as drivers of m-commerce gearing to implement m-commerce applications including m-banking, m-shopping, mobile information services, m-marketing and m-health and that the range of applications is being limited by a number of technical, business and policy challenges. He however envisaged that his proposed solutions to the identified challenges provides an organized technical and managerial approach to understanding and addressing the implementation challenges within the emerging domain of m-commerce. Saidi also researched on the opportunities and challenges of implementing mobile commerce in Malawi (Saidi, 2009). Despite finding drivers gearing to implement m-commerce applications including m-banking and finding opportunities and challenges of implementing mobile commerce in Malawi, the two studies specifically looked at mobile commerce and not MMI.

Safaricom Kenya launched M-PESA, an innovative payment service for the unbanked, in March 2007 (Hughes & Lonie, 2011). "Pesa" is the Swahili word for cash; the "M" is for the mobile (Nyirenda, 2012). A study by Camner et al (2009) shows that in Kenya, before introduction of M-PESA, people in the urban areas sent money to rural areas using the following ways: by hand sent with a family or friend; through bus companies; post office money order; directly into bank account; money transfer service; cheque; or paid into someone else account who passed it on. Among these alternatives, most people preferred sending the money using friends or family members. Use of courier companies and post office money orders was also popular. However, there is a massive reduction in the use of delivery by hand, post office orders and courier companies, following the introduction of M-PESA which people now prefer most (Camner et al., 2009). The two main gaps in Camner et al., (2009) research are that the study dwelled much on the effects of the adoption of mobile money services and not MMI, and that the study was specific to Kenya and not Malawi.

Alleman and Rappoport (2010) specifically asserted that Mobile Money Services (MMS) allows users/customers to benefit from remittances from either family members or friends living abroad. This alone, assuming all other factors remain constant; results in improved economic wellbeing as the poor gets a source of income. Allen et al (2014)

equally notes that the use of mobile money increases money circulation boosting local consumption for the rural people hence boosting economic activity. They further asserted that the flow of remittances to rural areas increase economic activity by enabling "just-in-time" transfers that make capital available whenever it is needed. Both studies focused on the use of mobile money in remittance and not MMI

Bhavhani et al (2008) demonstrates effects of using mobile money in the improvement in information flow between transacting parties allowing efficiency among the trading without travelling. This is noted particularly for users in rural areas where traders need to travel to urban areas to send and receive money. Hence, mobile money usage results in the reduction in transportation cost and consequently increased consumer surplus (Sife et al, 2010). The study findings however shows the positive effects of usage of mobile money services and not MMI.

Micheni (2014) conducted a study that aimed at developing a platform level interoperability model for mobile money transfer systems using the Real Time Gross Settlement (RTGS) money transfer system as a reference model. The study used both qualitative and quantitative data from the four main mobile money providers in Kenya, M-Pesa, Airtel Money, Orange Money and Yu Cash, to provide empirical evidence for the study. The model was validated by Structural Equation Modelling (SEM) using Analysis of Moment Structures (AMOS). The interoperability metric was developed based on ISO/IEC 15504-2 standard; after applying the metric to the four mobile service providers, the model was successfully accepted by experts. Even though the study is about MMI, it does not mention anything about specific opportunities and challenges of MMI. In particular, the study did not focus on Malawi.

In Mozambique, Batista and Vicente (2013) found evidence that the marginal willingness to remit is increased by the availability of mobile money. It also observed that substitution effects of mobile money for traditional alternatives for both savings and remittances.

In Niger, Aker et al (2011) looked at the effects of using mobile money accounts for delivery of cash transfers versus traditional methods. Specifically, they find that mobile money reduces the overall transaction costs of recipients, while offering an increase in freedom, flexibility, and privacy. Despite mentioning the effects of mobile money over

traditional alternatives for both savings and remittances, the study does not mention anything on how those effects enhance or hinder the adoption of MMI.

Another study that focused on mobile money was conducted by Thulani, Chitakunye and Chummun (2014), on usage level of mobile money, and how it has accelerated financial inclusion among the rural communities in Zimbabwe. It was found that the usage of mobile money by the unbanked rural people is very high, especially for sending and receiving remittances. However, the saving and loan aspect of mobile money are not very popular. Users are still relying on traditional methods of savings and borrowing. Even though the study findings show that the usage of mobile money by the unbanked rural people is very high and that users are still relying on traditional methods of savings and borrowing, it fails to show how this could affect (enhance or hinder) the adoption of MMI.

In conclusion, the rapid growth of the mobile money as a key point of reference on the adoption of MMI as a purpose of this research needed to be frequently studied so as to discover challenges as well as opportunities opening in mobile money systems. The review of existing body of knowledge in the adoption of mobile money technologies, although resourceful and insightful, has remained general as there is no clear mention of specific opportunities and challenges of mobile money that enhance or hinders the adoption of mobile money interoperability in Malawi. In line with the raised literature gap, this study strived to provide literature on opportunities and challenges of mobile money interoperability that contribute to the adoption of MMI in Malawi.

2.9 Research Theory and Conceptual Framework

Adoption of technology has been studied and different theories and conceptual frameworks have been formulated. According to Ndunguru (2007), conceptual framework is an assemblage set of research concepts cum variables together with logical relationships often presented in form of diagrams, charts, graphs, pictographs, flow-charts, organogram / organizational structure or mathematical equations. It seeks to give description of the research concepts together with the variables such as the independent variables (I.V) and dependent variable (D.V) as isolated but work in a unified system of relationships.

To achieve the research objectives and to answer the research questions well, this research uses the technology acceptance model (TAM) theoretical framework developed by Davis et al. (1989) with some modifications in consideration of Tornatzky and Fleischer (1990) theoretical framework of Technology Organization - Environment (TOE) (Zeleke, 2016) and the two concepts of effect of network externalities theory are relied upon in discussing the opportunities and challenges. Mobile money interoperability is an innovative and modernized technology in mobile money computing. As such its adoption by individuals is affected by various factors.

Specifically the research takes perceived ease of use and perceived usefulness from TAM model to have the perception of the target group towards adoption of Mobile Money Interoperability. Regarding the TOE model of Tornatzky & Fleischer (1990), the focus is on factors pertaining to external environment. Accordingly, legal, ICT infrastructures, competitive pressure and government support is considered from the environmental factors of the model to have a complete understanding of opportunities and challenges in the adoption of Mobile Money Interoperability in consideration of the literature review. Hence, the study uses a combination of both TOE and TAM frameworks with some modifications to benefit from both models. See figure 2.1 for a detailed research model.

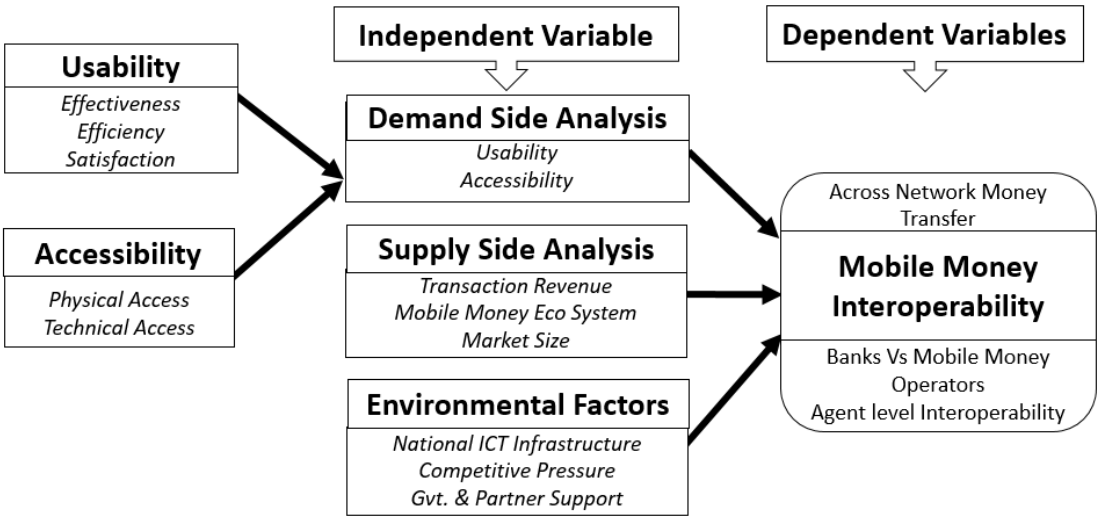

Figure 2.1: Research model for the adoption of MMI

(Source: Modified version of TAM and TOE)

2.9.1 Technology Adoption Theories

This section discusses on the technology acceptance and Technology Organization - Environment (TOE) theories as to how they relate to adoption of mobile money interoperability. Rogers (1995) defines an innovation as an idea, a practice or objective perceived as new by an individual, a group, or organization. It is both a process and an outcome (Edison et al, 2013). In this study, the innovation is the Mobile Money Interoperability. There are several factors that influence mobile money users to adopt the technology. Different researchers have proposed different models for technology acceptance. According to Taylor and Todd (1995), cited in Yakubu (2012), the problem of innovation diffusion can be approached from several levels. Some researchers have approached the problem from a micro-view within a societal context or at country level (Madden, Savage & Coble-Neal, 2000; Wolcott et al., 2001; Larry et al., 2002; Kiiski & Pohjola, 2002; La Ferle, Edwards & Mizuno, 2002). Other researchers have examined this issue at an organizational level (Harrison, Mykytyn & Riemenschneider, 1997; Plouffe, Hulland & Vandenbosch, 2001) and still other researchers have approached this issue by investigating the determinants of adoption and usage by individuals (Mathieson, 1991).

The motivation for this research is the determinants of adoption and usage of MMI hence the focus is based on the theoretical framework developed by Davis et al. (1989) (modified) with some modifications in consideration of (Tornatzky & Fleischer, 1990) theoretical framework of Technology Organization - Environment (TOE). TAM is one of the first and most influential research models to explain user's IT adoption behaviour (Davis et al., 1989). It is based on two main variables namely; perceived usefulness and perceived ease of use, as the fundamental determinants of IT adoption. This means an individual's intention to use an application is explained and predicted by his/her perception of the technology's usefulness and its simplicity. Venkatesh & Davis (2000) extends TAM model to include social and organizational variables such as subjective norm, image, job relevance, output quality and result demonstrability (Kim et al., 2010).

2.9.2 Discussion on Research Variables

The research model developed in figure 2.1 propose that accessibility, usability, transactional revenues, mobile money ecosystem, market size, and environmental

factors influence the adoption of interoperability platforms, with the assumption of any other intermediary variables that affect the relationships considered to be constant.

In this study, the dependent variables are the interconnection of mobile money services between mobile money network operators and banks alongside the interconnection among mobile money network operators, while the independent variables are accessibility, usability, transactional revenues, mobile money ecosystem, market size factors and environmental factors. The study is interested in examining the variability of these variables. Do these variables truly in any way affect the adoption of Mobile Money Interoperability frameworks across mobile money service providers, including banks in Malawi or not?

2.9.2.1 Demand side analysis - Usability

While Pagani and Schipani (2003) cites clear symbols and function keys, few and simple payment process steps, graphic display and help functions as important aspects related to mobile payment service usability, usability in this research conforms to International Standard Organisation 9241-11 (1998) which defines it as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use which is consistent with the concept of ease of use (Shackel, 1991). Effectiveness means the accuracy and completeness with which users achieve specified goals. Efficiency means the resources expended in relation to the effectiveness. Satisfaction means freedom from discomfort, and positive attitudes to the use of the product. (ISO 9241-11, 1998). ISO definition suggests usability as a multi-dimensional concept, whereas Frokjaer et al., (2000) cites efficiency, effectiveness and satisfaction as independent qualities of the system. The ISO definition concentrates on the attributes of efficiency, effectiveness and satisfaction (Nielson, 1993; Preece, Rogers & Sharp, 2002) cites learnability and memorability as other components of usability.

Usability in this study therefore refers to the extent to which the individual believes that existing mobile money transfer platforms are more advantageous as compared to traditional ways of conducting mobile money transactions. These benefits include allowing users to send or receive money, conduct mobile money activities anytime, anywhere at a lower cost, speedy and in an efficient manner.

Past studies and literature on adoption of mobile money have consistently showed that problems with usability have contributed to the low adoption of a variety of payments systems, including smart cards and mobile banking (Laukkanen & Lauronen, 2005). Perceived usefulness has therefore a strong influence on users' adoption of mobile money technology (Chopra et al., 2013; The Nation, 2017; Wang, Lin and Tang, 2003; Pikkarainen et al., 2004).

2.9.2.2 Demand side analysis - Accessibility

According to the global index indicators that are used to measure financial services, which is distinct from access to financial services, 'Access' most often refers to the supply of services, whereas 'use' is determined by demand as well as supply factors (Asli, Leora & Singer, 2013). Yoris and Kauffman (2007) labels the benefits provided by mobile technologies as "anytime and anywhere computing". A consumer may waste time to travel to a shop or an ATM to purchase goods or services when using cash, credit card or ATMs. Comparatively, Kim et al (2010) concludes that a combination of time and place which are the principal characteristics of m-payment is nothing but convenience. Findings by Mallat (2007) suggested that the relative advantage of mobile payments is related to the specific benefits provided by the new mobile technology: time-place independent payments, remote and ubiquitous access to payment services, and the possibility to avoid queuing and to complement cash payments.

Mallat (2007) found that usability and accessibility positively influences the adoption of mobile money interoperability. The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption (Kim, Mirusmonov & Lee, 2010).

2.9.2.3 Supply side analysis

Factors that are considered relevant to the adoption of MMI from the supply point of view were identified as perceived interest by service providers that MMI can help in increasing mobile money transaction revenue. A study by the Consultative Group to Assist the Poor CGAP (2017) found that interoperability encourages existing customers to transact more. This concurs with Metcalfe's law that states that the value of network grows at a square of the number of interconnected users. The second factor under consideration is that MMI expands mobile money eco system.

Chou and Shy (1990), cited in Beard and Chakravorty (2010), uses the Hotelling model and concludes that the market share and the amount of a software increase when the compatibility of the software increases. The idea is supported by an article that supports network externalities theory by peer review journal on the internet (Hove, 2005).

Finally, literature supports that MMI will increases mobile money market. This has been discussed by different scholars and organisations such as a study by CGAP that proved that as the scope and scale of networks expand, the overall value proposition of digital financial services (DFS) may improve and attract untapped customer segments (Cook, 2017). CGAP believes that interoperability brings entirely new customers into the DFS ecosystem. The study however agrees to the fact that the extent to which interoperability grows, the total number of users remains unproven. CGAP further believes that only through inclusive governance, balanced economic incentives and effective technology helps the schemes reach their potential. CGAP is working across markets to influence the debate and help shape rational, pro-poor solutions.

2.9.2.4 Environmental Factors

According to Tornatzky and Fleischer (1990), technology adoption within an organization is influenced by factors pertaining to the technological context, the organizational context, and the external environment. Based on this, the study adopted the TOE framework to summarize possible key environmental factors affecting MMI in Malawi such as legal, competitive pressure, government support and national ICT infrastructure.

According to Madise (2014), lack of interconnectivity or integrated national switch through which mobile network operators integrate with commercial banks' payment systems is cited as one of the challenges hindering full achievement of financial inclusion in Malawi. As observed by CGAP (2012), competitive pressure have strong influence on any operator to develop and adopt Mobile Money Interoperability solutions. Government support has also direct or indirect effect in the adoption and optimizing of innovations in mobile money through creating conducive environment and impetus for banking industries and their customers so that the services can be diffused to the community (Charalambos, Iacovou, Benbasat &. Dexter, 1995; Kuan, 2001).

2.9.3 Network Externalities Theory

The research further explored the opportunities and challenges of MMI using Network externalities theory. This is a two phased theory, i.e. the positive network effect and the negative network effect. The theory developed by Theodore Vail in 1908 was advanced significantly between 1985 and 1995 by the following researchers; Michael Katz, Carlo Shapilo, Josephy and Garth Saloner (Blind, 2004). According to Forbes (2007), the theory was popularised by Robert Metcalfe. The theory espouses that a good or service becomes more or less valuable when more/less people uses it; peoples' demand for a service or good are independent of one another. Network externalities are the effect on a user of a product or service of others using the same or compatible products or services. Farrell and Saloner (1985) argues that consumers benefit from a direct network externality in the sense that one consumer's value for a good increases when another consumer has a compatible good.

2.9.3.1 Effects of Network Externalities

In order to have a more precise forecast, this study utilised the two basic concepts of the network externalities theory, the Positive network externalities concept and the Negative network externalities concept. The concepts were utilised to formulate a report on opportunities and challenges of Mobile Money Interoperability platforms that enhance mobile money transfer across mobile money service providers, including banks, in Malawi.

As stated above, network externalities can be positive or negative. Positive network externalities exist if the benefits are an increasing function of the number of other users. Negative network externalities are just the opposite. Empirical studies over the last thirty years or so have helped confirm the existence of the positive effect of network externalities for several types of banking sector payment networks, including ATM networks, Automated Clearing House (ACH) and credit and debit payment cards (Leibbrandt, n.d.; GSMA, 2014).

According to GSMA (2014), Interoperability adds the ability for customers to transact with users in other schemes, therefore increasing the size of the overall payments network. A positive network effect applies to payment systems, just as it does for telecoms networks. When applied to interoperability of mobile money, positive effect

of network externalities leads to an increase in the number of transactions made in participating schemes, which in turn leads to increased transaction revenues and many more opportunities (Clark & Camner, 2014).

Katz and Shapiro (1985) establish direct-physical-effect, indirect effects, and experience and size of service networks as the three possible sources of benefits of positive network externalities. The section below briefly discusses how these benefits operate.

a) Direct-physical-effect

The utility that a consumer derives from purchasing a good depends on the number of other households or businesses that have joined the same network, for example, telephone, fax, telex and data networks. With a network effect, consumer's expectations will cause consumption externalities to give rise to demand-side economies of scale because consumers base their purchase decisions on expected network sizes (Katz & Shapiro, 1985).

b) Indirect effects

This also give rise to consumption externalities. For example, a consumer purchasing a piece of hardware, say a computer, will be concerned with the number of other agents purchasing similar hardware units. Because the amount of software that will be supplied for use with a given computer will be an increasing function of hardware units that have been sold. It is then called the "hardware-software paradigm." Other examples can be video games, video players and recorders.

c) Experience and size of service networks

Network externalities may arise for a durable good like automobiles when the quality and availability of post purchase service of the good depending on the experience and size of the service network, which vary with the number of units of the good that have been sold.

2.10 Chapter Summary

This chapter reviewed literature that focused on an overview of mobile money in general, Mobile Money Interoperability concepts and their effects and Network

externalities theories. Theories that have been reviewed include TAM, TOE and Network externalities. The study focused on the factors influencing the adoption of Mobile Money Interoperability to conceptualise the research model. The two concepts of network externalities theory upon which a report on opportunities and challenges of mobile money interoperability is formulated were are discussed. Literature review has shown that different factors influence adoption of mobile payments interoperability platforms and that the utility that a given user derives from the good depends upon the number of other users who are in the same “network” as is he or she.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses in detail the methodologies and processes which were used in conducting this study. It presents the strategies or the design of conducting the research focusing on population of the study, the area of study, sampling procedures. It also describes variables and measurement procedures including the methods for data collection, analysis and interpretation.

3.2 Research Setting

The research setting presents the context in which the research was carried out. The contents include: brief country profile of Malawi which include geography of Malawi, population and social status of the people. The section also highlights the economic situation, mobile phone penetration in Malawi and access to finance and financial Infrastructure in Malawi.

3.2.1 Country Profile

The research was conducted in Malawi, a country that gained its independence in 1964 (Government of Malawi, 2000) and is found in the south eastern party of Africa. The country is landlocked and has a young population of 17.5 million (2018); about 65 percent of the population is aged less than 24 years. The country is bordered by Zambia, Tanzania and Mozambique with Blantyre, Lilongwe, Mzuzu and Zomba as its main cities. Lilongwe is the capital city while Blantyre is considered as the country's main business centre. Malawi has relatively high literacy levels; 74.8 percent of the population (age 15 and over) can read and write (Greenacre, Malady & Buckley, 2014). Figure 3.1 illustrates map of Africa and Map of Malawi showing major cities.

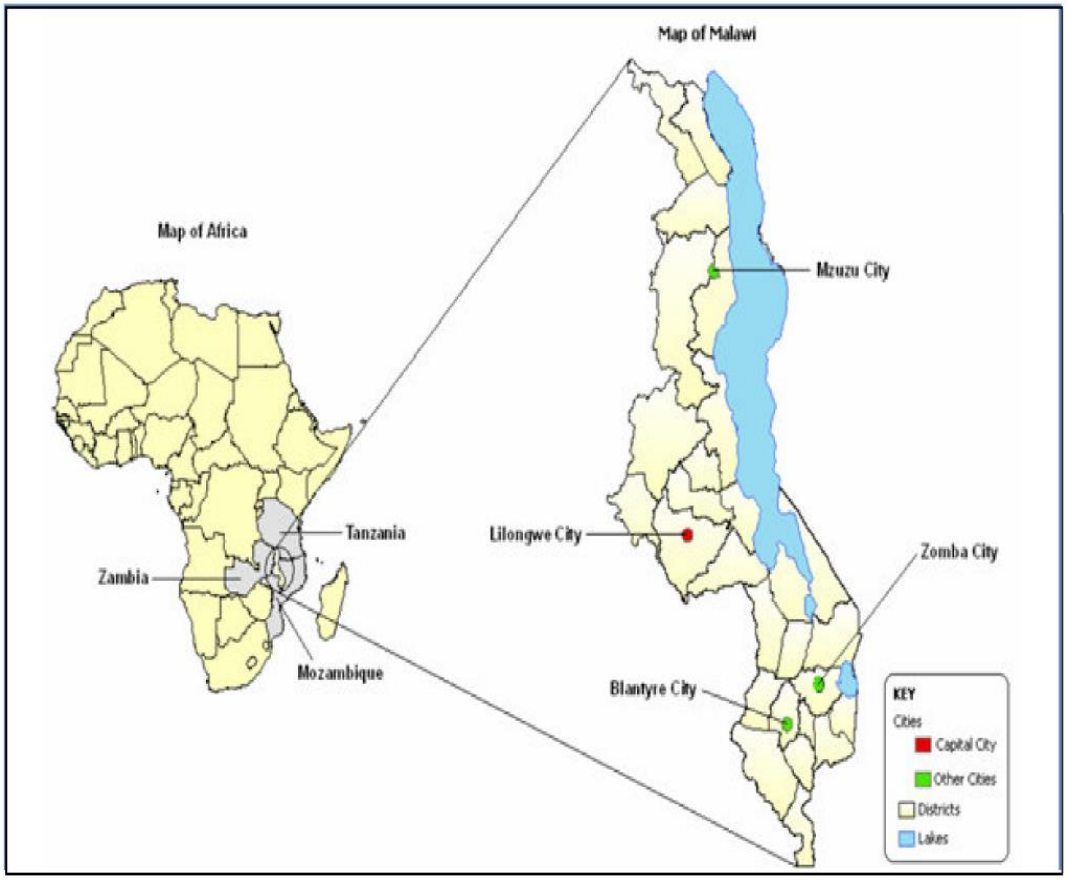

Figure 3.1: Map of Africa and Map of Malawi showing Cities

(Source: Msiska, 2009)

3.2.2 Economic situation of Malawi

The country's economy is agro based and predominantly rural-based, with a cash-based economy. According to the Food and Agriculture Organization (FAO), Agriculture remains the main source of income for more than 85 percent of the population; with Tobacco as the main forex earner seconded by Tea. Three quarters of the population live below the international severe poverty line of US$1.25 per day (Unicef, 2014). This conforms to Greenacre, Malady and Buckley (2014) research reported in the Regulation of Mobile Money in Malawi Project Report. Malawi's first ever labour force survey released by the National Statistical Office (NSO) in 2014 indicated that the country still experiences a high level (21 percent) of unemployment. As a result of this, there has been a rapid growth in the size of the informal economy and the reliance on cash transactions brings inefficiencies and insecurities that act as obstacles to the economy.

3.2.3 Mobile Phone Penetration in Malawi

There are three licensed operators that offer mobile telephone services in Malawi: Bharti Airtel (formerly Zain), Telekom Networks Malawi Limited (TNM) public limited company and Access Communications Limited (ACL) (Kasawala, 2013). According to Kasawala (2013), estimates suggest that approximately 90 percent of the population are covered by a mobile signal and mobile penetration is around 33 percent, of which 45 percent is rural based and 55 percent urban based. Mobile penetration rates are much lower than in many other countries (World Bank & ITU, 2017). However, the rate is higher than the percentage of people currently with access to formal financial services (19 percent).

According to World Bank and ITU (2017) reports, mobile phones can be successfully used as an access point for formal financial services, thereby increasing financial inclusion. However, Malawi's reliance on mobile money to facilitate the growth in financial inclusion may be constrained due to the challenges of developing a reliable and extensive mobile network infrastructure (Saidi, 2009). TNM launches LTE services and planned to invest $30 million in LTE infrastructure in the year 2017 (BuddeComm, n.d.).

3.2.4 Access to Finance and Financial Infrastructure in Malawi

According to Jonathan, Malady and Buckley (2014) and the Malawi national payment systems' vision and strategy framework for the period 2014 to 2018, estimated that 81 percent of Malawians do not have access to an account at a formal financial institution (RBM, 2013). Limited financial infrastructure, as indicated by statistics sourced from the FinMark Report, has so far inhibited growth in the use of formal financial services. Cash remains the most dominant payment mechanism. Remittances are an important source of income for many Malawians and the most popular remittance methods in Malawi are via the country's mobile payment channels; TNM Mpamba, Airtel money and Zoona.

3.2.5 Study Area

Data for this research was solicited from participants within Blantyre Central Business District (CBD) in southern Malawi. Blantyre is considered as the country's center of

finance and commerce. It is considered as the country's main business centre as compared to other rural districts hence;

3.2.5.1 Proportion of individuals with mobile money accounts is high (85 percent), compared to people in rural areas (NSO, 2015).

3.2.5.2 Activity levels of mobile money transactions are high (81percent) (NSO, 2015).

3.2.5.3 Blantyre host economically active population (Greenacre et al., 2014). The National Statistics Office (NSO) of Malawi states that an economically active population is a population which consist of all persons who are employed and unemployed (NSO, 2008).

3.2.5.4 Blantyre is where most banks and one mobile network service provider, TNM, are headquartered.

3.3 Study Population

This study had three purposively and conveniently selected population categories, namely; users of mobile money services, mobile money agents and service providers, which included employees from the two mobile network operators, TNM Plc and Airtel Malawi, and two commercial banks, National bank of Malawi and FBM Bank.

Data gathered from mobile money user category assisted the researcher to identify the current status of mobile money interoperability platforms in Malawi, to explore mobile money clients' needs and expectations' by examining how the existing mobile money service platforms affect accessibility and usability of mobile money services. Data collected from the second category of respondents, mobile money agents, aided the researcher to validate the current levels of MMI platforms in Malawi. Data collected from the last category of service providers helped the researcher to validate the status of mobile money interoperability in Malawi as reported by both mobile money users and mobile money agents, identify key players in the adoption of MMI and to make a throughout analysis of mobile money supply side and help the researcher to analyse the environmental factors affecting the adoption of mobile interoperability in Malawi.

All the three categories helped the researcher in formulating a report on opportunities and challenges of Mobile Money Interoperability platforms that enhance mobile money transfer across mobile money service providers, including banks, in Malawi.

3.4 Research Paradigm

The research was be guided by pragmatic research philosophy. This philosophy is the best philosophical foundation for mixed methods research. According to Creswell (2003), pragmatic paradigm indicates that the overall approach to research is that of mixing data collection methods and data analysis procedures within the research process. While Krauss (2005) define pragmatic research philosophy as a set of logically held together assumptions, concepts, and propositions that form the underlying basis used to construct a scientific investigation, this research define it as a research philosophy used to in mixed methods research that deals with something based on practical considerations, rather than theoretical ones.

Selecting the methodology involves making an assessment of the environment of the research, the research questions, and the issues that are known at the outset to be central to the study's progress (Creswell, 2013). Primary research to answer the research questions is dependent on the paradigm (Welch et. al., 2011; Tsang 2013). Tashakkori and Teddlie (1998) argues that there are three approaches to research; quantitative, qualitative and mixed methods. The quantitative approach tends to be associated with the post-positivistic paradigm which employs strategies of inquiry such as experimentation and survey and methods of data collection that are pre-determined measures resulting in numeric data. By contrast the qualitative approach tends to be associated with constructivist or the transformative-emancipatory paradigms which employs strategies such as the case study or narrative and uses methods or data collection such as the interview resulting in open ended data textual data. Thirdly, is the mixed methods approach associated with the pragmatic paradigm and strategies that involve collecting data in a simultaneous or sequential manner using methods that are drawn from both quantitative and qualitative traditions in a fashion that best addresses the research question/s (Creswell, 2003). In mixed research approach inquirers draw liberally from both qualitative and quantitative assumptions (Creswell, 2009).

Positivist research assumes that the world is not random, but ordered, regular and can be investigated objectively independent of the researcher and his or her instruments (Myers, 1997; Oates, 2006). With regard to systems development, the positivist approach regards systems development as a rational process in which actions are justified on rational grounds and appropriate organizational norms are observed (Howcroft and Trauth, 2004). This view, however, is not adequate as Information Systems (IS) are part of their social context of use and vice versa (Braa & Hedberg, 2002). For example, information technology (IT) development in developing countries involves multiple actors and an understanding of the interaction between these different actors is vital towards effective IT implementation and use (Walsham & Sahay, 2006). The positivist approach is therefore not always well suited to studying social phenomena as compared to the other paradigms (Oates, 2006; Tiwonge, 2009).

On the other hand, Orlikowski & Baroudi (1991) defined interpretive as a research paradigm that attempts to understand phenomena through the meanings that people assign to them. It seeks to understand the subjective reality of those that they study in order to make sense of and understand their motives, actions and intentions in a way that is meaningful for these research participants (Saunders, Lewis & Thornhill, 2003). Klein and Myers (1999) suggested that the use of interpretivism approach in business studies involves the principle of interaction between the researchers and the subjects. The interpretivist design includes a wider inclusion of data than positivism, and the data sources may include the media, social norms and various observations (Myers 2013).

From the above discussion of paradigms, it can be proposed that taking a particular approach to a paradigm implied taking a particular approach to research. Yet, the pragmatic paradigm implies that the overall approach to research is that of mixing data collection methods and data analysis procedures within the research process (Creswell, 2003). This assertion justifies the researcher's choice of pragmatic as the philosophical rationale employed for this study. Thus, the study adopted the pragmatism research philosophy because it is the best philosophical foundation for mixed methods research. The pragmatic paradigm implies that the overall approach to research is that of mixing data collection methods and data analysis procedures within the research process (Creswell, 2003). It links the choice of approach directly to the purpose of research (Creswell, 2003). Research is often multi-purpose and a "what works" tactic will allow

the researcher to address questions that do not sit comfortably within a wholly quantitative or qualitative approach to design and methodology. Supporting this, Darlington and Scott (2002) noted that in reality a great number of decisions of whether to take a quantitative or qualitative research approach are based not on philosophical commitment but on a belief of a design and methodology being best suited to purpose. Studies with pragmatism research philosophy integrates the use of multiple research methods such as qualitative and quantitative research methods. According to Saunders, Lewis and Thornhill (2012), pragmatics recognize that there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities.

3.5 Research Methods

This research was conducted using an exploratory concurrent triangulation mixed research approach method. The study heavily relied on the qualitative approach and very mildly on the quantitative methods and the notation for the study was: QUAL + quan. In doing this, the study wanted to identify the current status of MMI platforms in Malawi, to examine how the current platforms affect accessibility and usability of mobile money services and to explore opportunities and challenges of MMI platforms to providers and enabling institutions. The rationale for combining both qualitative and quantitative data was to better understand the research problem by combining both numeric values from quantitative research and the detail of qualitative research and to neutralize limitations of employing a single approach. The quantitative data and their subsequent analysis provided a general understanding of the research problem whereas the qualitative data and their analysis was used to refine and explain those statistical results by exploring participants' views in more depth (Rossman & Wilson, 1985; Tashakkori & Teddlie, 1998; Creswell, 2003).

The aim of exploratory research is to search for themes and possible linkages in the data that can be used to describe and model constructs that answer the research objectives (Sekaran and Bougie, 2013). Moreover, an exploratory study is undertaken when little is known about the situation at hand, or where little information is available on how similar problems or research issues have been resolved in the past (Oates, 2006). MMI is still at an infant stage both in Malawi and in most developing countries hence very little information in known about it. Themes were therefore developed from

what respondents mentioned as opportunities and challenges of MMI and short codes were assigned to provide a better understanding of the nature of the phenomena under scrutiny.

Creswell (2003) cites three approaches that are used in conducting a given research. These are quantitative, qualitative and mixed research approach. Quantitative research approach focuses primarily on the construction of quantitative data, and quantitative data is a systematic record that consists of numbers constructed by researcher utilizing the process of measurement and imposing structure (Kent, 2007). The quantitative research approach employ measurement that can be quantifiable (Bryman & Bell, 2007). Conversely, a qualitative research approach involves gathering of primary and secondary data that is useful for responding to research questions that require in-depth explanations (Smith et. al., 2009). Qualitative data cannot be measured but can be utilised to understand more about phenomena, to gain different perspectives on problems in terms of how much is already known and to obtain further in-depth data, which might be difficult to communicate quantitatively (Strauss and Corbin, 1990; Creswell, 2003). Moreover, the qualitative approach is the most appropriate way to examine, or respond to, questions requiring 'thick descriptions' or 'rich data' (Smith, 2008).

3.6 Research Strategy

The strategy chosen for this research work was a case study. Kothari (2004) defines a case study as a very popular form of research strategy which involves a careful and complete observation of a social unit, such as a person, a family, an institution, a cultural group or even the entire community as one collective. Yin, (2009) defines it as a collection of data from many sources in preparation for examining a particular case. Case study can be used to explore, describe, or explain phenomena by an exhaustive study within its natural setting (Benbasat, 1984; Bonoma, 1985; Kaplan, 1985 & Yin 2009), it gives researchers the chance to employ the chosen research design (exploratory and descriptive).

Ndunguru (2007) suggested that a case study design is characterized by depth and breadth allowing a researcher to conduct an intensive study of the case. Consistent with Ndunguru (2007), case study was used as the study required more detailed information

on MMI. Benbasat et al. (1987) proposes three reasons why case study is an appropriate strategy for conducting research in Information System (IS). Firstly, it enables the researcher to understand the nature and complexity of the process taking place. Secondly, it allows for the study of IS in its natural settings. Finally, it assists the researcher in gaining valuable insights into new topics emerging in the rapidly-changing IS area.

The case study design therefore suited well with this research because through supply side analysis, the researcher understood the challenges hindering service providers to fully adopt MMI, it allowed the research to be conducted within its natural setting as it was conducted in Malawi and targeted players in the mobile money ecosystem. This agrees with Benbasat (1984), Bonoma (1985), Kaplan (1985) and Yin 2009 that agreed that a case study can be used to explore, describe or explain phenomena by an exhaustive study within its natural setting. The research therefore exposed valuable and innovative insights emerging in mobile application computing and on how these contributes to the delivery of financial services. Furthermore, the exploratory case study approach was chosen for its appropriateness in investigations into areas and topics that are little understood and which have been less investigated previously (Churchill 1999; Deshpande 1983; McGivern 2006). Although issues of mobile money have been studied extensively, little is known about the opportunities and challenges that influence the adoption of MMI in the context of Malawi.

There are various forms of research strategies for a research including survey, case study and action research. Saunders et al., 2008 defines survey as a research strategy for deductive research approach. Action research is a strategy that has characteristics such as emphasizing on context and purpose of research, cooperation between the researchers and practitioners as well as necessity of implications of the research (Saunders et al., 2008).

3.7 Sampling Procedure

Respondents for the study were stratified into three categories, namely; mobile money users, mobile money agents and mobile money service providers. Patton (2001) describes stratified purposeful sampling as samples within samples and suggests that purposeful samples can be stratified or nested by selecting particular units or cases that

vary according to a key dimension (Cohen &. Crabtree, 2006). The sampling techniques used were purposive random, systematic and snowball. Money users provided both the qualitative and quantitative data, mobile money agents provided only qualitative data.

The researcher purposefully selected 12 mobile money agents in Blantyre and Limbe towns. Purposive sampling is a technique widely used for the identification and selection of information-rich cases for the most effective use of limited resources (Patton, 2002). Cresswell and Clark (2011) stated that purposive sampling involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest.

Mobile money agents were requested to provide a list of registered mobile money customers from the agent's transaction record they keep. From this list, the researcher recruited 62 mobile money users to be interviewed. Preference was given to the agents who were owners of mobile money businesses as opposed to those that were only employees. This was so because realistically business owners have ownership of the customer relationship than employees.

The research utilised snowball sampling technique to identify potential participants for the study from service providers' category. MMI being a new innovation in Malawi, the targeted population were deemed not knowledgeable about or experienced with a mobile money interoperability issues. The researcher therefore found it difficult to identify people who were conversant with it hence the choice of snowball technique was ideal in this situation. Saunders et al (2003) defined snowball or chain-referral sampling as a non-probability sampling technique commonly used when it is difficult to identify members of the desired population. Participants were asked to suggest others deemed to be knowledgeable about issues of mobile money, with focus on their technical knowledge and support in implementation of mobile money or mobile banking projects. A total of 15 respondents were recruited and this group provided important perspective to explore opportunities and challenges of MMI to providers and enabling institutions and significant data to validate information collected from mobile money users and agents regarding the current status of MMI in Malawi.

3.8 Data Collection Techniques

Primary data from mobile money users and agents was collected using semi-structured interviews while that of service providers were collected using structured interviews. Myers and Newman (2007) stated that there are three types of interview, namely; structured interviews, semi-structured interviews and group interviews.

Questionnaires were used to collect data on the study objectives and socio-demographic characteristics of the respondents. Questionnaires for mobile money users and agents were designed to accommodate both open ended questions and closed ended questions. Priority was given to storytelling, allowing participants to provide information at their own pace and probes were used to elicit additional details. Questionnaire for service providers mainly had had closed ended questions because this category were not available to dedicate time for in-depth interviews.

The sources of primary data included participants in all the three categories as outlined in above. Face to face interviews to mobile money users were conducted in vernacular language, Chichewa, at a convenient place to the study participant. The initial questionnaire were drafted in English but questionnaires for mobile money agents were translated into Chichewa language. The questionnaires were standardized and were structured for both open and closed – ended questions to allow the researcher to get greater generality in the formulation of initial research ideas and on interviewee's own perspectives. Closed-ended questions were presented in a manner that respondents indicate their level of agreement using a four Likert rating scale measurement where: Strongly Agree (SA) = 1; Agree (A) = 2; Disagree (D) = 3; and Strongly Disagree (SD) = 4. The use of Likert scale was to make it easier for respondents to answer question in a simple way. This increased comparability of responses as data was completed and reduced interviewer's effects and bias which facilitated a good organization and analysis of data.

Secondary data was collected using document analysis (desk research) technique. This data was sourced from online publications, print and electronic media and other literature that were reviewed. The intention of this approach was to gather secondary data from a variety of sources, including websites of regulators, operators, financial institutions, other mobile money stakeholders in Malawi and abroad and different

publications on mobile money payment systems and Mobile Money Interoperability. This was an ongoing process till the time of final report.

3.9 Reliability and Validity

To ensure that the instrument for the data collection were reliable such that the results obtained were valid, the questionnaires were pre-tested in Limbe; a town located about 10 kilometres away from Blantyre. Questionnaires were administered to conveniently selected mobile money users in Limbe (4), mobile money manager (1) and customer service officials (2) from TNM Plc. The pilot study allowed for modification of those items on the questionnaire that were considered unclear, inaccurate, inappropriate and misleading. Thus, the pilot study ensured that the instrument was valid and reliable, hence appropriate for the study.

Furthermore, to validate and ensure internal consistency ("reliability") and reliable the instruments, we conducted the Cronbach's Alpha on the Likert rating scale questions for the two questionnaires; one for mobile money user and the other for service provider. The results are presented in table below.

Table 3.1: Reliability Statistics - Mobile Money User Questionnaire

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
0.789	0.761	9

Table 3.2: Reliability Statistics - Service Provider Questionnaire

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
0.694	0.645	13

As indicated from the results above, the Cronbach Alpha for mobile money users' questionnaire was 0.789, which present a very strong internal consistency among the measured items. Whereas Cronbach Alpha for service providers' questionnaire was 0.694. Customarily values above 0.6 of Cronbach alpha coefficients are considered significant (Hair et al., 2006). According to George and Mallery (2003), the value of alpha should be greater than 0.7 so as to accept the instrument. And the closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale. The results of service providers' questionnaire were questionable.

However, the researcher decided to rely on the instrument because when it was pre-tested, the results were satisfactory.

3.10 Data Management and Analysis

3.10.1 Data Cleaning and Validation

Data quality steps were included in checking the data collected for internal consistency (in accordance with a scrutiny note), filter errors, appropriate coding all qualitative data and for non-response or missing values, values that fall out of range, and other logical checks. Cleaned data was made available in Statistical Package for Social Sciences (SPSS) version 20. Before analysis, all variables were fully labelled along with corresponding value codes in English in SPSS software.

3.10.2 Data Analysis

Data analysis contains a number of closely related operations which are performed with purpose of summarising and organising data in such a manner that they answer research questions (Kothari, 2004). The data, after collection, was analysed in accordance with the objectives of the study to help the researcher identify the developing themes. All quantitative data were analysed using descriptive, regression and multiple response analysis using SPSS version 20.

The study used Multiple Response Analysis on the other hand in order to analyse data on the perceived key players of mobile money Interoperability. Multiple Response Analysis deals with questions where several answers were possible, answers stored in as many variables as there are possible answers to the question (Horber, 2018). Multiple response allows one to create frequency and cross tabulation tables for user-defined "multiple response sets". Cox and Kohler (n.d) defined multiple responses by a degree of open-endedness.

Regression analysis and ANOVA were used to identify the relationships that existed between usability and accessibility of the current mobile money platforms and the adoption of mobile money services hence two regression models were run. The choice of this methods is backed by Cortson and Coleman (2003) who stated that regression techniques are used to determine the relationship between the variables. According to

Cortson and Coleman (2003), the most appropriate method of analysing likert data is the Analysis of Variance (ANOVA). ANOVA consists of calculations that provide information about levels of variability within a regression model and form a basis for tests of significance.

Specifically, coefficient of correlation was used to find out whether dependent variables under usability and accessibility are correlated with the existing mobile money platforms. Variables under usability i. e. effectiveness, efficiency and satisfaction were categorized into five parts namely; time saving, simple documentation processes, satisfaction, secure and easier. Whereas variables under accessibility i. e. physical and technical access were categorised into system challenges, insufficient cash float, additional cost, convenience, restrictive/prohibitive practices and maximum transaction limit.

Multiple regression analyses was used to determine whether variables under usability and accessibility have any significant effect on the adoption of mobile money. Cortson and Coleman (2003) stated that coefficient of correlation (R) less than 0.50 represent weak correlation while coefficient of correlation (R) greater than 0.05 represents strong correlation. The coefficient of determination (r^2) is the square of the sample correlation coefficient between outcomes and predicted values. As such it explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (adoption of mobile money) that is explained by all independent variables under demand side analysis. Summaries of the results were therefore analysed as such and presented in the form of frequency distribution tables, percentages, proportions charts, graphs and regression tables.

Conversely, qualitative data was recorded during interviews. After each interview, all recorded data was transcribed verbatim. Where the interview was conducted in local language, Chichewa, the transcription was then translated into English. Bailey (2008) argues that presentation of audible data into written form is the first step of analysing data. The study further asked service providers questions to seek their views on the perceived opportunities and challenges of MMI and results were qualitatively analysed. We developed themes from what these respondents said were opportunities and challenges and short codes were assigned. Statements that were similar from the

interviews were identified and arranged in categories based on the short codes. New categories that emerged from succeeding interview transcriptions were added to the existing list of categories. After arranging the data in categories based on themes, paragraphs in each category were compared and contrasted in order to discover similarities and differences; to build typologies and to identify sequences and patterns.

In many qualitative studies whose purpose it is to generate knowledge about common patterns and themes within human experience, this process continues with the comparison of each new interview or account until all have been compared with each other (Thorne, 2000). The themes that arose from the study were compared with the two concepts of Effect of Network Externalities theory to find out which factors are positive effects and those that are negative effects of network externalities. The differences in the themes from the study and those from reviewed literature helped to uncover emerging themes which were used to further build theories on Mobile Money Interoperability platforms that enhance or hinder mobile money transfer across mobile money service providers, including banks in Malawi. A summary of the identified themes formed the framework upon which this report was compiled.

3.11 Limitations of the study

All data gathered in this research relied on self-reporting. It was therefore possible that respondents would be inclined to either over report or under report for security reasons and/ fearing that the study may expose some of their individual weakness and weakness of their employers, or thinking that their participation in the study would guarantee them an incentive. In an attempt to minimise such incidences, the researcher adhered to research ethics throughout the entire research process. Ethics is the code of moral principles and values that governs the behaviour of an individual or group with respect to what is right or wrong (Bartton & Gold, 2000).

Throughout the research, the researcher upheld and respected the participants' right to privacy, anonymity, fair treatment and to protection from discomfort and harm (Neuman, 2003). Specifically, the researcher;

3.11.1 Guaranteed maximum confidentiality of persons' identity and collected data. The participants from service providers' category were not mandated to write or tell their names or anything that can be used to identify them;

3.11.2 Provided an assurance to the participants that their responses were to be used for academic purpose only; and

3.11.3 Wiped out their responses as no more required after completing the research

Apart from over reporting or under reporting, participants in the study were not a representative of the large Malawian population because they were only drawn from a very urban set up who seems to be relatively educated. This contrasted to a unique context of the Malawian set up whose population, according to FinMark (2016), is predominantly rural based and rate of literacy levels are considered one of the lowest (42 percent) in Africa (CARE-Malawi, 2009). The research therefore proposes a need to conduct another study that would include rural settlers as outlined in section 5.4 of this report. However, being a case study, there is a degree of generality of the results since mobile money users in Malawi share the same regulations and experiences all over the country as regulated by the Reserve Bank of Malawi regulations and the proportion of people who use mobile money in Malawi is higher in urban areas as compared to rural areas (NSO, 2015)

3.12 Chapter Summary

The research was guided by pragmatic research philosophy which used a concurrent triangulation mixed research method whose strategy was a case study. The participants were identified through stratified purposive sampling technique. Semi-structured interviews were used to collected data from mobile money users and mobile money agents in Blantyre and Limbe, while structured questionnaires were administered to employees from MNOs and Banks who were conveniently and purposively selected. Descriptive and regression analyses were used to analyse quantitative data whereas thematic data analysis with the use of codes supporting emerging themes was used to analyse qualitative data.

CHAPTER FOUR

RESULTS AND DISCUSSIONS OF THE FINDINGS

4.1 Introduction

The chapter presents results and makes a discussion of the findings. The objectives of the study outlined in section 1.9 of chapter one were the principal guiding factors used in collecting the data. The data was interpreted according to research objectives. Appropriate data analysis and presentation techniques were used. Discussions were done based on the findings and the literature on mobile money interoperability and mobile money in general.

The research had three target groups, namely, mobile money users, mobile money agents and service providers. The researcher assigned variables that were enquired to provide background information about the respondents based on which better conclusion could be drawn. The first section of the findings and discussions looked at the demographic characteristics of respondents in all the three categories. The second section presents findings and discussions on the current status of mobile money interoperability in Malawi as reported by respondents in all the categories and information sourced from secondary data. The other sections give details of the findings and discussions on key players of MMI, accessibility and usability of the current mobile money transfer platforms and finally a detailed report on key opportunities and challenges of MMI as factors that can enhance or hinder the adoption of MMI in Malawi.

4.2 Socio-demographic characteristics of respondents

The impact of demographics on electronic services adoption has been extensively studied in the past (Cruz, Laukkanen & Muftoz-Gallego, 2009; Nysveen, Pedersen &.

Thorbjornsen, 2005; Laukkanen, Sinkkonen & Kivijarvi, 2007; Laukkanen & Pasanen, 2008). Studies focusing on the adoption of new technologies refer to a predominance of male, younger, more educated and higher income persons, when compared to those who do not adopt innovations (Sim &. Koi, 2002).

4.2.1 Demographic Information of Mobile Money Users

This section describes the socio-demographic characteristics of the 62 mobile money users who were interviewed. The result are presented in table 4.1 below.

Table 4.1: Mobile Money Users' Detailed Profiles

Variable	**Frequency**	**Category**	**Percentage**
Nationality	Malawian	62	100.0
Gender	Male	39	62.9
	Female	23	37.1
Age	Less than 20 Years Old	1	1.6
	Between 20 - 29 Years Old	24	38.7
	Between 30 - 39 Years Old	30	48.4
	40 Years and Above	7	11.3
Education level	Primary School Level	17	27.4
	Secondary School Level	30	48.4
	Professional Certificate	4	6.5
	Diploma Level	7	11. 3
	University Degree	4	6.5
Occupation	Young School Leavers	3	4.8
	Unemployed	3	4.8
	Employed	24	38.7
	Business	31	50.0
	Others	1	1.6
Registered Wallet	Registered on TNM Mpamba	35	56.5
	Registered o Airtel Money	14	22.0
	Registered on both Networks	13	21.0
Own a Bank Account	Yes	23	37.1
	No	38	61.3
Bank where account is held	National Bank of Malawi	11	17.7
	Standard Bank	2	3.2
	FDH Bank	1	1.6
	FMB Bank	6	9.2
	NBS	2	3.3
	ECO Bank	1	1.6
	Did not own a bank account	39	62.9

4.2.1.1 Nationality

As highlighted in section 2.1.4 of this report that remittances are an important source of income for many Malawians, it is noted from the above results that mobile money users who participated in the study were all Malawians. The results therefore show that mobile money as an innovation has been adopted in Malawi.

4.2.1.2 Gender

The sex of individuals has been used to determine the role individual respondents must be subjected. This might be useful to observe how both gender groups, men and women are dealing with similar socio-economic activities. The results in table 4.1 show that majority of mobile money users were male. The findings follow the observations made by Venkatesh and Morris (2000) who found that men may be more task-oriented than women. In this context, task-orientation may be defined as the accomplishment of a task that requires the use of mobile money technology.

4.2.1.3 Age

In terms of age, the results in table 4.1 show that more than half of the respondents were young people, aged below 40. This indicates that young people are more technologically advanced hence found technology adoption easier to use than older respondents. This implies that the use of mobile money services is determined by the age of an individual. This is drawn from the assumption that younger people use technology more than older people. Previous findings show that older individuals have a lower propensity for adopting new technology-based services (Oumlil & Williams, 2000). Earlier studies (Laukkanen et al., 2007) show that mature customers have more resistance to the internet and mobile banking services than younger bank customers. This outcome is consistent with the expectation that younger people are more receptive to mobile money services than older ones.

On the other hand, only 1.6 percent of mobile money users were of age group less than 20 years old. This could entail school going age group which normally have their phones switched off during classes.

4.2.1.4 Education level

Education is a crucial variable that helps in the understanding and application of basic concepts, principles and regulations. Kennickell, Arthur and Kwast (1997) have illustrated how education play important role in determining household use of e-money products. Educational levels of users determine whether they will adopt electronic payment or not. Mobile money is part of electronic payment technology and because the focus of this study was to explore opportunities and challenges that enhance or hinders the adoption of Mobile Money Interoperability platforms. It was therefore important to find out respondents' level of education as this can be a factor that affect the demand for mobile money products as well as help to assess the level to which they can appreciate key technology issues.

The results in table 4.1 show that all the respondents for this study had attained some level of formal education. This also agrees with the NSO (2015) survey on access and usage of ICT services in Malawi that clearly revealed that mobile money service was mostly used among individuals with highest education level (40 percent) as compared to those with primary or lower education at 5 percent. Education assists people to learn on how to read and write. The users of mobile money system need to know how to read system generated SMS messages which are written in both English and Chichewa. In addition, the users should be able to follow instructions and provide appropriate details when carrying out a mobile money transaction. This suggests that one's level of education influences the type of mobile payment system adopted.

4.2.1.5 Source of income

Mantel (2000) asserted that the income level of customers influence the type of electronic payment system they adopt. This was ascertained in this study by asking mobile money users the source of their income. As indicated in table 4.1 above, majority of respondents (50 percent) mentioned business as their main source of income, followed by those that are employed (38.70 percent). The results signifies that income or wealth of customers have a strong influence on the type of payment system they adopt.

The findings confirm the result of a study that revealed that gross income and ownership of bank accounts appear to be insignificant in determining the use of mobile money services in Botswana (Maradung, 2012).

4.2.1.6 Registered Mobile Money Wallet

Table 4.1 shows that majority (56.5 percent) of respondents in this category were registered on TNM Mpamba. The results therefore indicates that TNM Mpamba was used more in urban areas as compared to Airtel money (22.6 percent). The results are consistent with the findings of the NSO (2015) survey which found that Airtel money was used more in rural areas (64 percent) as compared to urban areas (60 percent) while TNM Mpamba was used more in urban areas (33 percent) as compared to 29 percent in rural areas.

4.2.1.7 Account at a formal bank

Consistent to RBM (2013) and Jonathan, Malady and Buckley (2014), this study found that majority (61.3 percent) of mobile money users did not own an account at any financial institution or bank. Reports on the financial access in Malawi reveal that only 19% of the population have bank accounts, 55% do not use any financial product and 74% save their wealth in cash and kind (UNCDF, 2014). The results are also similar to the findings by Finscope (2009) which revealed that 80 percent of adult population in Malawi is unbanked. Regarding the bank where respondents' accounts were held, majority mentioned National Bank of Malawi (NBM).

In analysing the rate of adoption to mobile money financial services, Micheni et al. (2013) argue that the consideration of financial costs on the part of the population may prevent the masses from choosing a financial service including mobile money. However, due to the prevalence of mobile phones in many regions in Africa, mobile financial services are often more accessible and affordable than banking services offered by traditional bank branches (Majanga, 2016).

4.2.2 Demographic Information of Mobile Money Agents

This section describes the socio-demographic characteristics of the 12 mobile money agents who were interviewed in this research. Data was analysed and the results are presented in the table 4.2.

Table 4.2: Mobile Money Agents' Detailed Profiles

Variable	**Category**	**Frequency**	**Percentage**
Gender	Male	7	58.0
	Female	5	42.0
Age	Between 20 - 29 Years Old	6	50.0
	Between 30 - 39 Years Old	5	42.0
	40 Years and Above	1	8.0
Education level	Primary School Level	1	8.3
	Secondary School Level	6	50.0
	Professional qualification	4	33.3
	Post graduate	1	8.3
Business Ownership	Own business	9	75.0
	Employee	3	25.0
Number of Years in mobile money business	Less than 2 years	3	25.0
	Between 2 years and 5 Years	4	33.0
	Between 5 years and 10	3	25.0
	10 years and above	2	17.0
Business Location	Limbe	8	66.6
	Blantyre	4	33.3

4.2.2.1 Gender

Table 4.2 shows that majority (58 percent) of mobile money agents were male. The findings are similar to the results obtained in the demographic characteristics of mobile money user in this report, which also found that the majority of mobile money users were male.

Apart from Venkatesh and Morris (2000), similar results were also obtained by Venkatakrishnan and Nicholaus (2013) in their study that examined the challenges facing mobile money transfer services and their expansion in Singida, Tanzania. Conclusively, a lot of male subjects engage in mobile money businesses than their female counterparts in Blantyre, Malawi.

4.2.2.2 Mobile money agents 'age

Results in table 4.2 above show that majority of respondents in mobile money agents' category were young people, aged between 20 to 40 years. The findings confirm the assertion by Yakubu (2012) whose study looked into the adoption and use of electronic payment systems in Ghana by individuals, small businesses and corporate bodies and found out that young people below the age of 40 were in majority to embrace the e-zwich payment system.

4.1.2.3 Education level

Studies have shown that highly-educated people patronize electronic payment products than less-educated people. The technicalities involved in some electronic payment transactions discourage less educated people to patronize its use (Annon, 1999). This study found that over 50 percent of people engaged in mobile money business had least attained a minimum level of secondary education.

4.1.2.4 Business Ownership

Results in table 4.2 above show that this research achieved its sampling strategy as 75 percent of respondents were business owners. As mentioned in section 3.6 of this report, business owners usually have ownership of the customer relationship than their employees hence data collected from them about users can be trusted upon.

4.1.2.5 Experience

Experience is measured by the number of years a user has with computers in general (Venkatesh & Davis 2000). Users may employ the knowledge gained from their prior experience to form their intentions (Fishbein & Ajzen, 1975). Mobile money applications are relatively simple and could be mastered easily and faster. However, continuous usage may improve the perception of ease of use of the applications and hence have a bearing on adoption. Figure 4.2 revealed that majority of mobile money agents have been in mobile money business between 5 to 10 years hence they had adequate knowledge and experience of mobile money business.

4.1.2.6 Mobile Money Agents Business Premise Location

Table 4.2 show that majority, 66.6 percent, of mobile money agents who took part in this study had their business premises in Limbe. This outcome is consistent with the expectation that velocity of business transactions in Limbe is high as compared to Blantyre city. Limbe is the site to many of the industries in Blantyre district and well known for Indian traders. Recently, there has also been an influx of Chinese owned businesses in Limbe. This is why many regard Limbe as the commercial capital of Blantyre.

4.2.3 Demographic Profiles of Service Providers' Participants

In order to obtain a detailed understanding of respondents in this category, demographic profiles of the 15 mobile money transfer service provider employees who participated in the study were also analysed. The result of the survey are presented in the table 4.3 below.

Table 4.3: Service Providers Respondents' Detailed Profiles

Variable	**Category**	**Frequency**	**Percentage**
Gender	Male	10	73.0
	Female	5	27.0
Age	Between 20 - 29 Years Old	5	33.0
	Between 30 - 39 Years Old	8	53.0
	40 Years and Above	2	13.0
Education level	Professional Diploma	4	26.7
	University Degree	10	66.7
	Post graduate	1	6.7
Proportion of service provider by company	TNM Employee	7	47.0
	Airtel Malawi	2	13.0
	National Bank of Malawi	5	33.0
	FMB Bank	1	7.0
Work Experience	Less than 3 years	1	6.7
	Between 3 years and 5 Years	7	47.0
	Between 5 years and 10	4	27.0
	10 years and above	3	20.0
Respondents department	Information Technology	3	20.0
	Billing	3	20.0
	Mobile Money	7	47.0
	Mobile Banking	2	13.0
Respondents' Work relation to Mobile Money/ Banking	Core	7	47.0
	Regular	6	40.0
	Sporadic	2	13.0

Figure 4.3 shows that there were more male respondents (73 percent), majority of respondents in this category were aged between 30 and 39 (53 percent), majority had attained a minimum of Secondary School education level, and respondents from Telekom Networks Malawi (TNM) contributed 47 percent of all the respondents. In terms of work experience, majority (46.7 percent) of employee's over 3 years work experience hence the greater the number of years in mobile money business, the more reliable the data is. A further analysis was made to identify the relationship of these respondents (employees) departments' to mobile money business. About half of the respondents (47 percent) of the respondents reported that they were working under mobile money department. Another 47 percent of the employees reported mobile money as core to their day to day work

4.3 Identifying the current status of MMI in Malawi

This section explored in detail what was identified as the current status of Mobile Money Interoperability in Malawi. Questions were specifically asked to mobile money users, mobile money agents and service providers. Data was analysed and the results are presented below.

4.3.1 Mobile Money Users' response

The researcher based his analysis on the mobile money users' knowledge of MMI, what they have heard about MMI, source of such information, their opinion and experience in the use of MMI.

4.3.1.1 Mobile Money Users' Knowledge

Recognising that awareness can be a major determinant of adoption of a technology by customers, Mobile money users were asked to mention what they knew about Mobile Money Interoperability (MMI). A lot of literature support the idea that lack of awareness is a major bottleneck to achieving mobile money success.

The majority (74.2 percent) of mobile money users who participated in this study reported that they had little knowledge about Mobile Money Interoperability (MMI). The table 4.4 presents the results of the research findings on mobile money users' knowledge of MMI.

Q. *Can you tell me what you know about Mobile Money Interoperability?*

Table 4.4: Respondents' Knowledge about MMI

Variable	**Frequency**	**Percentage**
Respondents who Knew MMI	13	21.0
little Knowledge about MMI	46	74.2
Don't Know about MMI	1	1.6
No Response	2	3.2

The respondents who had little information about MMI said that they just enjoy the popular adverts playing on radio and television, but ironically do not pay much attention to the messages being communicated. This is food for thought for Mobile money operators' marketing teams.

Questions were also asked to assess if respondents had heard anything about MMI from other people and the source of such information. While 8.1 percent reported that they had heard about MMI, 87.1 percent reported that they did not hear anything about MMI. Table 4.5 show the results.

Q. What have you heard anything about MMI?

Table 4.5: Knowledge about MMI

Variable	**Frequency**	**Percentage**
Heard about MMI	5	8.1
Did not hear	54	87.1
Did Not Respond	3	4.8

To validate the above results, questions were asked to the respondents who reported to have heard about MMI about the source of information (channel of communication).

Q. Where did you hear about MMI?

Table 4.6: Channel of Communication

Variable	**Frequency**	**Percentage**
Radio	6	46
TV	3	23
Social Media	2	15
Interpersonal Communication Channels e.g. SMS	1	8
Others means	1	8

The result from table 4.6 above indicate that 46 percent of the respondents got information about MMI through radio, seconded by television at 23 percent, social media channels at 15 percent and interpersonal communication channels and other means being the least at 8 percent each. This entails that out of all channels that mobile money operators and banks uses to communicate to their customers, social media is relatively effective with radio being the most effective channel with the highest respondents' rate at 46 percent.

Normally, it would have been expected that Interpersonal communication channels have the highest ranking in informing people considering that it is through these channels that providers send direct messages through SMS to their customers as compared to customers getting messages from radio adverts. However, if we add up the percentage by mass media channels, radio and television, we have a sum total of 71 percent.

The findings agree with the 2014 survey on access and usage of ICT services in Malawi which found that majority (96 percent) of the selected individuals in Malawi listen to a radio. This study therefore recommends radio as the most effective tool of communication and that commercial businesses should prioritize radio advertising to market their products and services including mobile money interoperability.

4.3.1.2 Mobile Money Users' Experience

To identify respondent experience in the use of Mobile Money Interoperability, mobile money users were also asked if they had ever used MMI products and services, why they decide to use MMI products or service, whether they were satisfied with the service and to state reasons why they were at all not satisfied. The results revealed that majority (93.5 percent) of selected mobile money users have no experience in the use of MMI. See table 4.7 below for detailed results.

*Q. Have you ever pushed or pulled money to or from bank into your mobile wallet or withdrawn cash from your mobile wallet using any ATM**?***

Table 4.7: Use of MMI Service

	Frequency	Percentage
Ever used	3	4.8
Never used	58	93.5

When those that had reported to have ever used MMI were asked on the reason why they decided to use MMI products or services, they reported a number of issues as analysed in the table 4.8 below.

Q. Why did you decide to push or pull the cash?

Table 4.8: MMI users Experience

	Frequency	Percentage
Unavailability of MM Agent	1	1.6
Agent had no Cash	1	1.6
To Save on Time	1	1.6

To validate the above responses, the study evaluated the level of awareness and the extent/ level of frequency of use of mobile money and MMI. The results in table 4.9 revealed that majority (56.5 percent) of participants frequently send or receive money to or from other people via TNM Mpamba, Airtel Money or Zoona.

Table 4.9: Mobile Money Usage

	Frequency	Percentage
Frequently (At least Once a Month)	35	56.5
Infrequently (< 1 a month but ≥1 in every 3 Month)	17	27.4
Occasionally (≥ than 1 every 3 Months)	10	16.1

The results in table 4.10 revealed that 1.6 percent of the total respondents' withdrew Money from TNM Mpamba wallet at an FMB ATM, 3.2 percent used this service occasionally while 83.9 percent never used this service and the remaining 11.3 percent do not even know the existence of the service.

Table 4.10: Withdrew Money from TNM Mpamba wallet at an FMB ATM

	Frequency	Percent
Infrequently (< 1 a month but ≥1 in every 3 Month)	1	1.6
Occasionally (≥ than 1 every 3 Months)	2	3.2
Never	52	83.9
Don't Know	7	11.3

79 percent of the respondents never pushed money from their mobile wallet into an account at a bank, 21 percent did not know if this was possible in Malawi.

Table 4.11: Pushed money from their mobile wallet into an account at a bank

	Frequency	Percent
Never	49	79.0
Not aware of MMI	13	21.0

The results on table 4.12 below revealed that 72.6 percent were aware but never pulled money from an account at the bank into their mobile wallet, 25.8 percent responded that they did not know about the product while 1.6 percent did not respond.

Table 4.12: Pulled money from an account at the bank into their mobile wallet

	Frequency	Percentage
Never	45	72.6
Don't Know	16	25.8

67.7 percent of the total respondents reported that they have never acquired a loan from a bank through their mobile wallet, 32.3 percent reported that they were not even aware if this was possible in Malawi. Refer to table 4.13

Table 4.13: Acquire a loan from the bank through Mobile Money

	Frequency	Percentage
Never	42	67.7
Don't Know	20	32.3

4.3.1.3 Mobile Money Users' Opinion

To gather data about respondents' own opinions about MMI, the researcher wanted to know how mobile money users and other people would react if MMI was fully adopted in *Malawi*. Question was asked to assess whether other people they knew would be interested to see Malawi achieving interoperability across network money transfer (between Mpamba and Airtel Money). The results in table 4.14 shows that all of the respondents' agreed that other people would be interested to see Malawi fully adopting MMI.

Q. Do you think people you know would be interested to see Malawi achieving interoperability across network money transfer?

Table 4.14: Reaction of other people on MMI - Opinion

	Frequency	Percent
Yes, Others will be interested	62	100.0

The researcher then sought to know if the respondents themselves would want MMI to be fully adopted in Malawi. The results revealed that 96.8 percent would be interested while 3.2 percent reported that they would not be interested to see Malawi fully adopting interoperability of mobile money. The results are shown in table 4.15.

Table 4.15: Responds' own reaction to the adoption of MMI - Opinion

	Frequency	**Percent**
Yes, will be interested	60	96.8
No, will not be interested	2	3.2

4.3.2 Mobile money agents and service providers knowledge

Apart from mobile money users, the researcher also asked mobile money agents and respondents from the service providers' category, i.e. employees from MNOs and financial institutions. The objective was to assess their knowledge on MMI and to validate what was reported by mobile money users on current status of mobile money interoperability. Data was analysed and the results have been highlighted below.

4.3.2.1 Mobile Money Agents' knowledge

Mobile money agents facilitate the important cash-in and cash-out transactions (at a minimum) by converting physical money to eMoney and vice-versa. Mobile money agents were asked on what they know about MMI. Majority of the agents (75 percent) reported that they were not aware of mobile money interoperability, 25 percent indicated that they were aware that MMI was adopted in Malawi. One participant said:

> *I am aware that customers are now able to withdraw money from their TNM Mpamba wallet at any Auto Teller Machine (ATM) for FMB bank. However, I don't think interoperability for TNM Mpamba with Airtel Money exist as it is with voice calls and SMS. Every day I serve customers who come to me for a cash out transaction and immediately they do a cash in transaction of the same amount to a wallet of a different provider.*

Participants who were knowledgeable of TNM Mpamba cash withdraw at FMB Auto Teller Machine (ATM), as evidenced from the quote above, were not even aware that it is possible to directly send money from TNM Mpamba to Airtel Money. In addition, they felt that mobile money users were not aware that Malawi as a nation had adopted

MMI. It is evident from the quote above that users do cash out transactions and immediately they cash in the same amount to a wallet of a different provider. The researcher, therefore, is of the view that such customers may not be aware of the existence of the MMI between different schemes which could be due to insufficient awareness to potential consumers.

Here are comments from some of the participants:

> *"In this country, it has not been possible to send money directly from Airtel Money to TNM Mpamba seamlessly."*

> *"I only know about Zoona which most customers I serve don't even like because the transaction fees are very high compared to fees charged when a customer uses TNM Mpamba or Airtel Money."*

The two quotes above clearly indicate that there is a gap in knowledge about the adoption of MMI by mobile money agents in Malawi. According to McGrath (2015), mobile money agents are a key element for branding and education which reinforce marketing communications and the customer journey in mobile money business. This knowledge gap therefore suggests inadequate content in the advertisements in the media and maybe inadequate number of advertisements for the customers to understand the needed capabilities of the adoption of MMI.

This agrees with a research by Tsilizani (2015) that was aimed at assessing the impact of mobile money in malawi. The study found that 23 percent of mobile money agents who took part in her study disagreed that they have the knowledge about mobile money services, The study concluded that while most mobile money agents provide clear information to customers about mobile money services, some agents were still not as effective as evidenced by the 23 percent agents who accepted the knowledge gap. Tsilizani further found that for that group of respondents who admitted that they lacked knowledge about mobile money services, they failed to explain clearly some of the services offered by Airtel money and its operations thereby misleading customers as such the customers were not encouraged to register and use mobile money service resulting in loss of revenue.

Other studies have also shown that lack of information, money and education are among the top four reasons for not using mobile money (FinMark Trust, 2016). The studies also revealed that trust on mobile money service providers and mobile money agents are important for mobile money adoption (Morawczynski, 2009; Osei-Assibey, 2015). This implies that more people can be encouraged to adopt mobile money services through mobile money awareness campaigns. Cost, trust and inability to produce the required documentation are the least cited barriers against mobile money services adoption (FinMark Trust, 2016).

4.3.2.2 MMI services offered by Service Providers

Respondents from the service providers' category were asked to mention the type of MMI service they provide and to identify the key players in the adoption of MMI. The objective was to validate what was reported by mobile money users and mobile money agents about the current status of mobile money interoperability in Malawi. Table 4.16 presents a summary of the type of MMI service offered by each service provider as mentioned by selected individuals from the service providers' respondents.

Table 4.16: MMI services offered by each service provider

	Service Provider			
Type of MMI service	**Airtel**	**FMB**	**NBM**	**TNM**
Allow Customers to withdraw money direct from their mobile wallet using ATM		✔		✔
Allow our customers to directly get a loan from an account at a bank.	✔			
Allow our customers to pull money from account at bank into their mobile wallet.	✔		✔	✔
Allow our customers to push money from their mobile wallet to an account at bank.	✔		✔	✔

Although all respondents in the service providers' category did not mentioned any inter-network money transfer service, analysis of secondary data revealed that currently in Malawi it is possible for mobile money customers to send or receive money across mobile network money transfer. According to information sourced from Telekom

Networks Malawi (TNM), TNM Mpamba and Airtel Money mobile money transfer partnership went live in 2018 (Telekom Networks Malawi, 2018).

The above results validates what the researcher found in his preliminary research that was done through analysis of various documents that discussed about status of MMI in Malawi as highlighted in section 1.4 of this report.

4.3.2.3 Key Players in Mobile Money Interoperability

Service providers were also asked to select their perceived key players in the adoption of Mobile Money Interoperability from the list of typical mobile money players and stakeholders who play different roles or derive diverse benefits from the whole mobile money ecosystem. The list comprised of mobile money users, mobile network operators, financial institutions, MACRA, RBM, National Switch (Nat Switch - it is regarded as platform provider for MMI in Malawi), mobile money agents, retailers and billers (billers are third party organisations such as utility service providers). Multiple response analysis was carried out to identify the key players amongst those that were listed. As discussed in section 3.9.2 of this research, multiple response analysis deals with questions where several answers were possible.

The results revealed that service providers, in this case, Mobile Network Operators (MNOs) and financial institutions, mobile money users and regulatory authorities (central bank and MACRA) are the perceived key players for the adoption of MMI. Conversely, MMI was first implemented in Malawi without the involvement of platform provider (Nat switch) and mobile money agents, retailers and billers (third party organisations such as utility service providers); these played no role in the adoption of MMI. The findings are recorded in tables 4.17 and 4.18 below

Q. Who are the key players in the adoption of mobile money interoperability?

Table 4.17: Case Summary – Key players in MMI

	Cases					
	Valid		**Missing**		**Total**	
	N	Percent	N	Percent	N	Percent
$Key Players[a]	15	100.0%	0	.0%	15	100.0%

The results in table 4.17 above indicate that they were 15 participants who responded to this question. They all ticked at least one of the options representing a 100 percent response rate. As presented in table 4.18 below, those 15 respondents ticked 54 options in total which entails an average of slightly more than 3 options per respondent. Apparently, the results of the analysis in table 4.18 show that all options (players) mentioned in this study play different roles in mobile money business.

Table 4.18: Frequencies of Key players in MMI

	Responses		**Percent of Cases**
	N	**Percent**	
Financial Institution	10	18.5%	66.7%
Mobile Network Operators – MNOs	14	25.9%	93.3%
Central Bank	5	9.3%	33.3%
MACRA	4	7.4%	26.7%
Platform Providers e.g. Nat Switch	2	3.7%	13.3%
Mobile Money Customers – Users	13	24.1%	86.7%
Mobile Money Agents	4	7.4%	26.7%
Retailers	1	1.9%	6.7%
Billers	1	1.9%	6.7%
Total	**54**	**100.0%**	**360.0%**

The results however indicate that Mobile Network Operators (MNOs), Mobile money customers (Users) and financial institutions have the highest scores; 93.3% for MNOs, 86.7 percent for users and 66.7 percent for financial institutions. These options have had shares of 25.9 percent (MNOs), 24.1 percent (Users) and 18.5 percent (financial institutions). Results for MACRA (26.7 percent) and Central bank (33.3 percent) constituted a total of 60 percent; the two were regarded as scores for regulatory authorities. The study therefore find these four to be the key players in the adoption of MMI.

The results are consistent with findings by Tsilizani (2015), McGrath (2015) Di Castri (2013) and Klein and Mayer (2011). The study by Tsilizani (2015) found that the key to acceptance of mobile money transfer is in the hands of customers when they reach a defined point where advantages begin to outweigh disadvantages. The role of mobile money users cannot, therefore be emphasised because users stand at the centre of the

whole mobile money ecosystem. They are the ones who make transaction volumes to either increase or descrease.

McGrath (2015) stated that service providers should assess benefits, costs and risks of different interoperability solutions and inform policy makers to ensure that interoperability brings value to the customer, makes commercial sense, is set up at the right time and regulatory risks are identified and mitigated. Policy makers in this regard are regulatory authorities, namely; MACRA and Reserve Bank of Malawi (RBM).

While Klein and Mayer (2011) outlined the central bank's role as setting standards for interconnection, Di Castri (2013) stated that a policy maker should act as a facilitator, helping providers to create the road map that they will be primarily responsible for designing and implementing MMI. Policy makers also assist service providers with their evaluation to ensure that interoperability is set up at the right time, that it creates value for both customers and providers, and that regulatory risks are identified and mitigated.

4.4 Examining how existing mobile money Platforms affect Usability and Accessibility – Demand Side Analysis

In order to meet this objective, questions were asked to mobile money users to measure their attitude towards statements that were meant to examine how the existing mobile money platforms affect accessibility and usability of mobile money services (demand side analysis). The analysis was based on respondents' distribution of responses (percent that agreed or disagreed) and regression analysis.

4.4.1 Usability of current mobile money transfer platforms

Factors under usability were categorized into five parts namely; time saving, simple documentation processes, satisfaction, secure and easier. The respondents were asked to indicate which of them best expressed the perceived factor of adoption.

Data was analysed and the results revealed that majority (92 percentage) of mobile money users who participated in this study agreed to the statement that mobile money services are easier to use, 90 percent reported that mobile money services save on time and reduce waiting time on a queue, followed by 79 percent that agreed with the

statement that documentation processes are fair with mobile money service as compared to traditional bank process. Finally, 53 percent strongly agreed that they are satisfied with the existing mobile money platforms. The findings are presented in table 4.19 below.

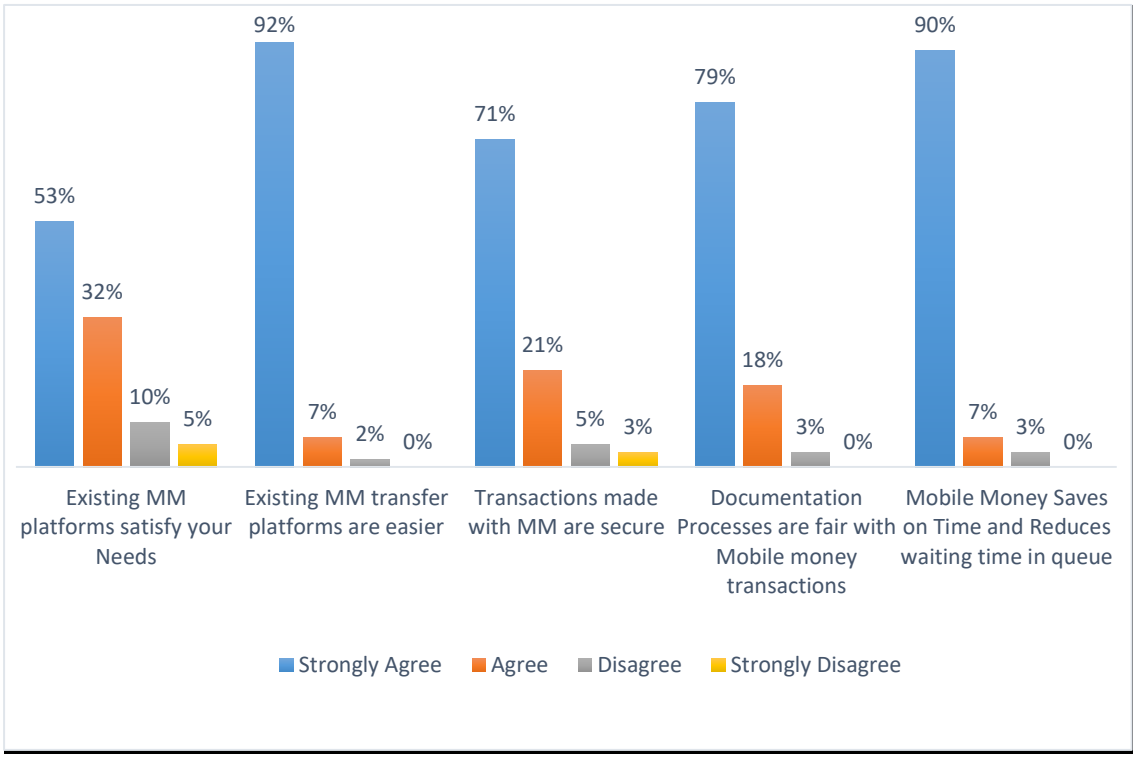

Figure 4.1: Users' Attitude towards Usability of Existing Mobile Money Platforms

Source: Author's field data

The results are consistent with a recent research by Ndekwa, Ochumbo and John (2018) that suggested that there is a significant relationship between students' attitude (easier to use, speed up transactions) and the adoption of mobile money services. Other studies also report that mobile money adoption is driven by perceived usefulness, perceived ease of use, and cost (Tobbin, 2012; Upadhyay, Parijat & Jahanyan, 2016; Nyirenda & Chikumba, 2013), among other factors. The results are also supported by a recent media report that stated that there have been long queues in banking halls as well as at ATMs which was cited as one of the key challenges facing technology initiatives to deliver financial solutions in Malawi (The Nation, 2017).

Regression analysis was carried out to examine the extent of variables under usability (Time Saving, Simple Documentation, Satisfaction, Secure, and Easier) on the existing mobile money platforms in Malawi. This section discusses the findings in detail.

Table 4.19: Model Summary – Usability

Model	R	R Square (R^2)	Adjusted R Square	Std. Error of the Estimate (S)
1	0.810[a]	0.655	0.625	0.497

Predictors: Time Saving, Simple Documentation, Satisfaction, Secure, Easier

The model summary in table 4.19 above provided the R, R^2, Adjusted R^2 and standard error of the estimates (S). The table was used to determine how well correlation analysis fits variables under usability. The correlation coefficient is given by R and is a measure of the linear association between the variables. The coefficient of determination (r^2) is the square of the sample correlation coefficient between outcomes and predicted values. As such it explains the extent to which changes in the dependent variable i.e the adoption of mobile money services can be explained by the change in variables under usability. Or the percentage of variation in the dependent variable that is explained by all usability variables under demand side analysis and supply side analysis. The coefficient of determination, R^2, is used to analyse how differences in one variable can be explained by a difference in a second variable.

Value of 0.81 shows a very strong positive correlation between variables under usability. It is deduced from the value of 0.81 that our independent variables (IV) i.e. usability of mobile money services explain 81.0% of the variability of the dependent variable (adoption of mobile money services). R Square is the proportion of variance in the dependent variable (adoption of mobile money services) which can be predicted from the independent variable (usability). An R^2 value of 0.655 (65.5%) indicated that the regression line perfectly fitted the data used for the study. This means 65.5% of the variance in usability can be predicted from the variable adoption of mobile money services.

As predictors are added to the model, each predictor will explain some of variance in the DV simply due to chance. The adjusted R-square therefore attempts to yield a more honest value to estimate the R-squared for the population. The adjusted R^2 value of 0.625 (62.5%) indicated how well the IV (variables under usability) predicted the DV (the adoption of mobile money services). The Adjusted Coefficient of Determination (Adjusted R-squared) is an adjustment for the coefficient of determination (R^2) that takes into account the number of variables in a data set (Horse Theme, 2009).

The Standard Error of the Estimate (S) represents the average distance that the observed

values fall from the regression line. Conveniently, it tells you how wrong the regression model is on average using the units of the response variable. The results in table 4.19 above revealed S as 0.497, which tells us that the average distance of the data points from the fitted line was about 4.97%.

Table 4.20: ANOVA[a] – Usability

Model 1	Sum of Squares	Df	Mean Square	F	Sig.
Regression	26.339	5	5.268	21.292	0.000[b]
Residual	13.855	56	0.247		
Total	40.194	61			

Predictors: Time Saving, Simple Documentation, Satisfaction, Secure, Easier

Table 4.20 shows the output of the ANOVA analysis and whether there is a statistically significant difference between our group means. As explained in section 3.10.2 of this report, ANOVA consists of calculations that provide information about levels of variability within a regression model and form a basis for tests of significance.

The Sum of Squares represents the total variability around the mean and is associated with the three sources of variance i.e. Regression, Residual and Total. While the sum of residual equals the sum of squared errors in prediction, sum of regression means improvement in prediction by using the predicted value of Y over just using the mean of Y.

DF are the Degrees of Freedom associated with the sources of variance. The total variance has N-1 degrees of freedom. In this case, there were N=62 observations, hence the DF for total is 61. It should be noted that the regression degrees of freedom corresponds to the number of predictors minus 1 (K-1).

Mean Squares are the sum of squares divided by their respective DF. Results in table 4.20 above indicate that for the Regression, 26.339 / 5 is equal to 5.268. For the Residual, 13.855 / 56 equals 0.247. These are computed so we can compute the F ratio, dividing the Mean Square Model by the Mean Square Residual to test the significance of the predictor(s) in the model.

The F Value is the Mean Square Model (5.268) divided by the Mean Square Residual (0.247), yielding F=21.292. The p value associated with this F value is very small (0.0000). These values are used to answer the question "Do the independent variables

reliably predict the dependent variable?" The p value was compared to the alpha level (typically 0.05) giving us a significance value is 0.000 (i.e., p = .000), which is smaller, hence we could conclude "*Yes, the independent variables reliably predict the dependent variable"*; The results establishes that the regression model was significant and thus reliable for making conclusions and recommendations (Sig. <0.05).

As much as the p value was established in table 4.20 above, still it was not known which of the specific groups differed. The research therefore used multiple regression analysis to find out which of the factor components under usability of the existing mobile money platforms (satisfaction, easier, secure, simple documentation and time saving) were significant predictors of usability. In relation to table 4.21 below, the most significant predictor of Usability was Satisfaction (beta = 0.522, t= 3.280, sig =0.002).

Table 4.21: Coefficients[a] - Usability

Model 1	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	0.377	0.228		1.658	0.103
Satisfaction	0.500	0.152	0.522	3.28	0.002
Easier	-0.557	0.371	-0.340	-1.49	0.139
Secure	0.342	0.241	0.310	1.422	0.161
Simple Documentation	0.388	0.268	0.219	1.44	0.153
Time Saving	0.098	0.464	0.051	0.211	0.834

The results revealed that all the factor components of adoption of mobile money (Satisfaction, easier, Secure, Simple documentation processes, and time saving) were significant predictors of Usability. A positive correlation indicated that a relationship existed between existing mobile money platforms and usability variables and that the relationship was positive while a negative correlation (-.0340) meant that the variable may not be correlated in some, but not all cases.

This results are consistent with the conclusions made by Chong et al. (2010) who found a strong relationship between usability and adoption of technology. Another study by Oliveira, Mauro Cherubini and Nuria (2012) also found that satisfaction is mostly influenced by how users perceive the usability of mobile services hence influence its adoption.

4.4.2 Accessibility of existing Mobile Money

Figure 4.23 show results of users' attitudes towards accessibility of existing mobile money transfer platforms. 89 percent of mobile money users who took part in this study were of the view that existing mobile money transfer platforms are convenient to access, any time, any day. However, 69 percent strongly agreed with the fact that lack of adequate capital in terms of cash floats by mobile money agents renders mobile money agents ineffective to assist customers satisfactorily. 60 percent strongly disagreed with the statement that said maximum deposit allowable by operators is enough. 47 percent strongly agreed to the statement that the existing mobile money transfer platforms experience a lot of system challenges. 26 percent agreed to this statement. 3 percent disagreed while 19 percent strongly disagreed to the statement. 45 percent of the respondents strongly agreed to the statement that mobile money service providers add restrictive practices or probative costs to payment schemes. Finally, majority (69 percent) of respondents did not agree to the statement that maximum deposit allowable by mobile money operators is enough. The bar charts in figure 4.23 below provide the summary of the results.

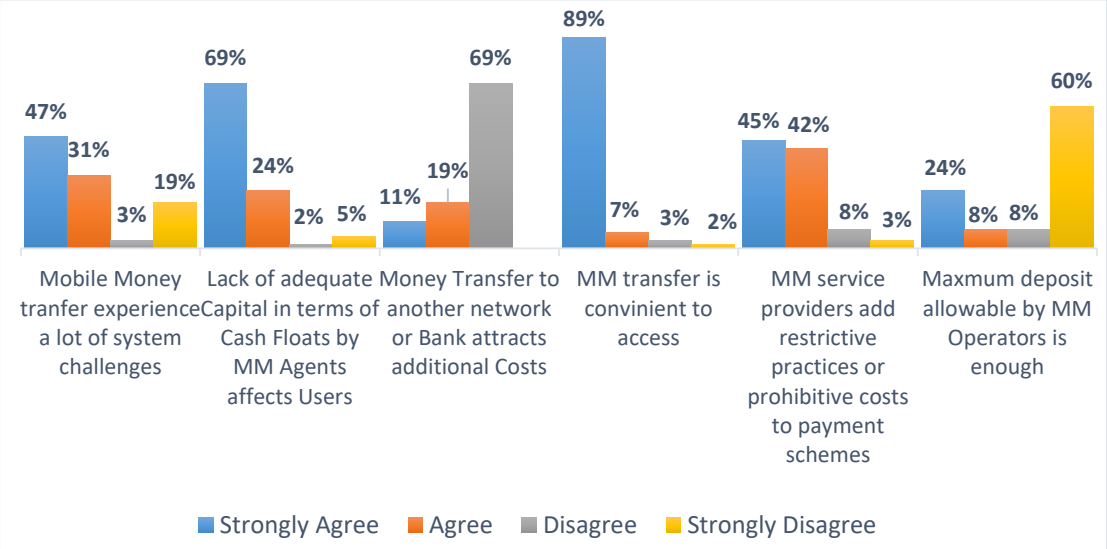

Figure 4.2: Users Attitude towards Accessibility of existing mobile money platforms

Source: Author's field data, 2017

The researcher also wanted to examine the extent of accessibility variables on the existing mobile money platforms in Malawi. In doing this regression analysis was carried out whose findings are recorded below.

Table 4.22: Model Summary – Accessibility

Model	R	R Square – R^2	Adjusted R Square	Std. Error of the Estimate
2	0.789[a]	0.623	0.582	0.525

Predictors: System Challenges, Insufficient Cash Float, Additional Cost, Convenience, Restrictive/prohibitive practices, Maximum transaction limit

The value of 0.789 shows a very strong positive correlation between the variables. It is deduced from the value of 0.789 that our independent variables explain 78.9% of the variability of the dependent variable (accessibility). An R^2 of 0.623 (62.3%) indicated that the regression line perfectly fitted the data used for the study. The adjusted R2 value of 0.582 (58.2%) indicated how well the IV (system challenges, insufficient cash float, additional cost, convenience, restrictive/prohibitive practices and maximum transaction limit) predicted the dependent variable.

Table 4.23: ANOVA[a] – Accessibility

Model 2	Sum of Squares	Df	Mean Square	F	Sig.
Regression	25.035	6	4.173	15.140	0.000[b]
Residual	15.158	55	0.276		
Total	40.194	61			

Predictors: System Challenges, Insufficient Cash Float, Additional Cost, Convenience, Restrictive/prohibitive practices Maximum transaction limit.

The p value from table 4.23 (ANOVA) was compared to the alpha level (typically 0.05) giving us a significance value is 0.000 (i.e., p = .000), which is smaller. The results therefore shows that the regression model was significant and thus reliable for making conclusions and recommendations (Sig. <.05).

Multiple regression analysis was also performed to find out which of the factor components under accessibility of the existing mobile money platforms (i.e. system challenges, insufficient cash float, additional cost, convenience, restrictive/prohibitive practices and Maximum transaction limit) were significant predictors of accessibility. In relation to table 4.24 below, the most Significant predictor of accessibility was system challenges (beta = 0.592, t= 3.238, sig =0.002).

Table 4.24: Coefficients[a] – Accessibility

Model 2	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**sig**
	B	**Std. Error**	**Beta**		
(Constant)	0.989	0.441		2.244	0.029
System Challenges	0.423	0.131	0.592	3.238	0.002
Insufficient Cash Float	0.277	0.211	0.258	1.311	0.195
Additional Cost	-0.195	0.205	-0.183	-0.952	0.345
Convenience	-0.076	0.256	-0.052	-0.296	0.768
Restrictive/ prohibitive practices	0.086	0.235	0.083	0.365	0.717
Maximum transaction limit	0.023	0.147	0.037	0.157	0.876

Predictors: System Challenges, Insufficient Cash Float, Additional Cost, Convenience, Restrictive /prohibitive practices Maximum transaction limit

The results therefore revealed that all the factor components of existing mobile money platforms (System Challenges, Insufficient Cash Float, Additional Cost, Convenience, Restrictive/ prohibitive practices and Maximum transaction limit) were significant predictors of accessibility. A positive correlation indicated that a relationship existed between adoption and accessibility variables and that the relationship was positive while a negative correlation (-0.183 and -0.052) meant that the two variables are not correlated in some, but not all cases.

The results are consistent with a study by Tsilizani (2015) who found that mobile money agents are not able to provide enough float to serve customers satisfactorily and that mobile money network is not very reliable as it keeps going on and off which makes it difficult for the customers to perform the transactions. The results are also supported by a feature in *The Daily Times* where the report established that where mobile money agents were operational, they were struggling with liquidity problems (The Daily Times, 2016). Considering that Network reliability stands as a pillar for the operation of mobile money services, Claessens (2006) argued that improved access to financial services requires the prerequisites of availability, reliability, flexibility and continuity of access.

4.5 Exploring opportunities and challenges of MMI to providers and enabling institutions

Statements were asked to assess the perceived opportunities and challenges of MMI to service providers and enabling institutions. The responses assisted the researcher to validate some of the issues that were mentioned by both mobile money users and agents of mobile money transfer as being opportunities and challenges of MMI.

4.5.1 Supply side analysis

The results shows that all participants, 100 percent, from service providers' category agree with the statement that Mobile Money Interoperability can help increase mobile money transaction revenue. Majority of participants in this category (93 percent) also agreed to the statement that MMI platforms will increase the market size of mobile money business in Malawi (60 percent strongly agree whereas 33 percent agree). Similarly, the majority of respondents in this category (93 percent) agreed to the statement that MMI platforms increases mobile money eco system. 67 percent reported that lack of motivation hinders staff to propose and advance technology innovations, 60 percent agreed that MMI breeds mistrust and profit sharing ratio agreements between service providers. Finally, 74 percent of the respondents agreed to the statement that opening up to MMI implies some surrender of market share to small MNOs and banks. Refer to figure 4.27 for summary of results on supply side analysis.

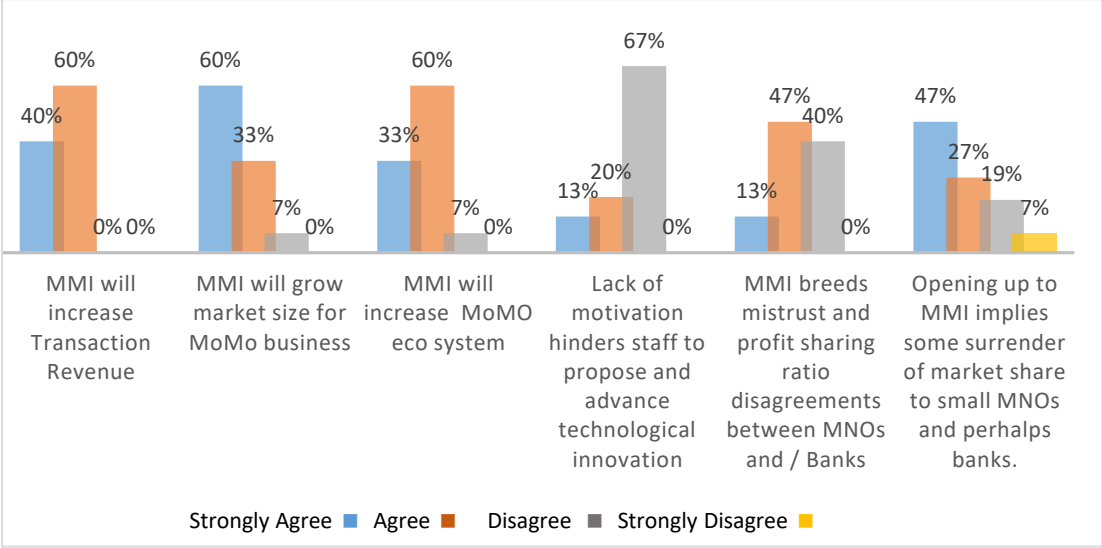

Figure 4.3: Supply Side Analysis Supply

Source: Field data, 2017

To validate the perception of service providers towards variables under supply side analysis, the researcher wanted to know how the adoption of Mobile Money Interoperability platforms affect transactional revenues, mobile money ecosystem and mobile money market size. Mobile money monthly revenue figures and customer registration figures were therefore collected from one service provider, TNM Mpamba, for the period between May, 2013 and December, 2018. The rationally was to assess the actual effects of the adoption of MMI on customer registration and on revenue.

The results after data analysis indicated an increase in both monthly total customer registration counts and total monthly revenues as shown by the rise in exponential trend lines for both customer registration counts and revenues in figure 4.28. The results revealed that revenue was at pick in the year 2018 and that more customers were registered in the same year. It should be appreciated that TNM Mpamba first adopted MMI in July 2017 but many interconnections were done in 2018 as highlighted in section 1.4 of this report.

A probe into what the service provider (TNM Mpamba) thought could have attributed to this revenue growth and increase in customer registrations revealed that the success of their mobile money business was a result of the adoption of MMI. An informant from TNM narrated:

> *Of late, we have experienced growth in mobile money revenues since the introduction of MMI in 2017. This growth is attributed to growth in daily transaction accounts that has come as a result of the many integrations that TNM Mpamba has made with banks.*

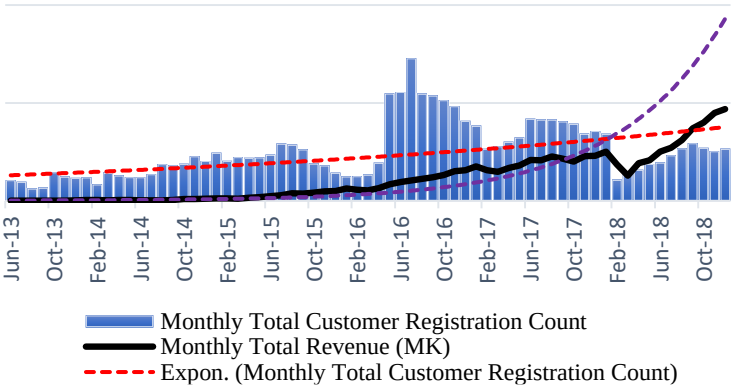

Figure 4.4: Mpamba Daily Average Revenue and Customer Registrations

Source: Field data (2018)

Commenting on the effect of MMI on the entire mobile money ecosystem, one participant from Airtel Malawi said:

> *"MMI has enabled Airtel money to experience viable increase in transaction volumes and extend the range of financial services that we offer".*

The results supports a recent study by Consultative Group to Assist the Poor (CGAP) that hypotheses that Interoperability encourages existing customers to transact more (Cook, 2017) thereby increasing mobile money revenue. CGAP (2017) indicated that interoperability can unlock the potential of digital financial services (DFS) and advance financial inclusion. This agrees with Metcalfe's Law that states that the value of a network grows at the square of the number of connected users. Metcafe law is a principle dating back to the communications networks of the 1980s. CGAP (2017) stated that data from the history of today's SMS and ATM services prove this theory as it relates to telecommunications and traditional payment networks. Since mobile money service providers charge transaction fees on all mobile money transactions, this research concludes that revenue that these service providers realise from the increased transaction levels will eventually be on the rise with the introduction of mobile money interoperability.

In a similar study, CGAP observed that as the scope and scale of networks expand, the overall value proposition of digital financial services (DFS) may improve and attract untapped customer segments (Cook, 2017). Quite simply, the more you can do with mobile payments, the more people are likely to want to use them. The study by CGAP proved the hypothesis that 'Interoperability expands access to digital financial services'. By this, CGAP believes that interoperability may bring entirely new customers into the DFS ecosystem.

Conversely, majority (74 percent) of respondents from the service providers' category were of the view that MMI breeds miss trust on profit sharing ratios among service providers. This was validated by a comment from one respondent from this category who reported;

As mobile money service network provider, we had always wanted to make our mobile money to interoperate with banks. However, we always disagree on profit sharing ratio with almost all the banks when we are discussing the interconnection business agreement. Though business agreements are reached, the cost is always pushed to the customers.

The negative effect concept of Network Externalities Theory by Katz and Shapiro (1985) supports the above finding as it indicates how a firm may let rivals into its network, trading-off the higher value of the network (due to its increased size) against the sharing of the profits with their rival (Leibbrandt, 2004).

Respondents in this category also agreed with the statements that opening up to interoperability implies some surrender of market share to smaller operators and perhaps banks. This is supported by Benson and Loftesness (2013) who stated that Network interoperability is rarely used when service providers are competing for business within a single market. This is because network interoperability would facilitate out-of-network providers competing for business with local or existing providers. Finally, majority of the respondents did not agree with statement that said Lack of job advancements/ motivation hinders competent staff to propose and advance technological innovation.

4.5.2 Environmental Factors

Environmental factors and organisational history have been major factors hindering Mobile Money Interoperability in most economies (Nyakwawa, 2016). According to Tornatzky and Fleischer (1990), technology adoption within an organization is influenced by factors pertaining to the technological context, the organizational context, and the external environment (Tornatzky & Fleischer, 1990). This research adopted TOE framework and TAM with some modification to summarize possible key environmental factors affecting the adoption of Mobile Money Interoperability in Malawi. The factors under consideration were awareness, legal, competitive pressure, government support and national ICT infrastructure. Data was analysed and the following sections discusses in detail the responses of the respondents regarding perceived environmental issues that were mentioned as affecting the adoption of MMI,

based on the research model. Figure 4.29 summarises the results on environmental factors.

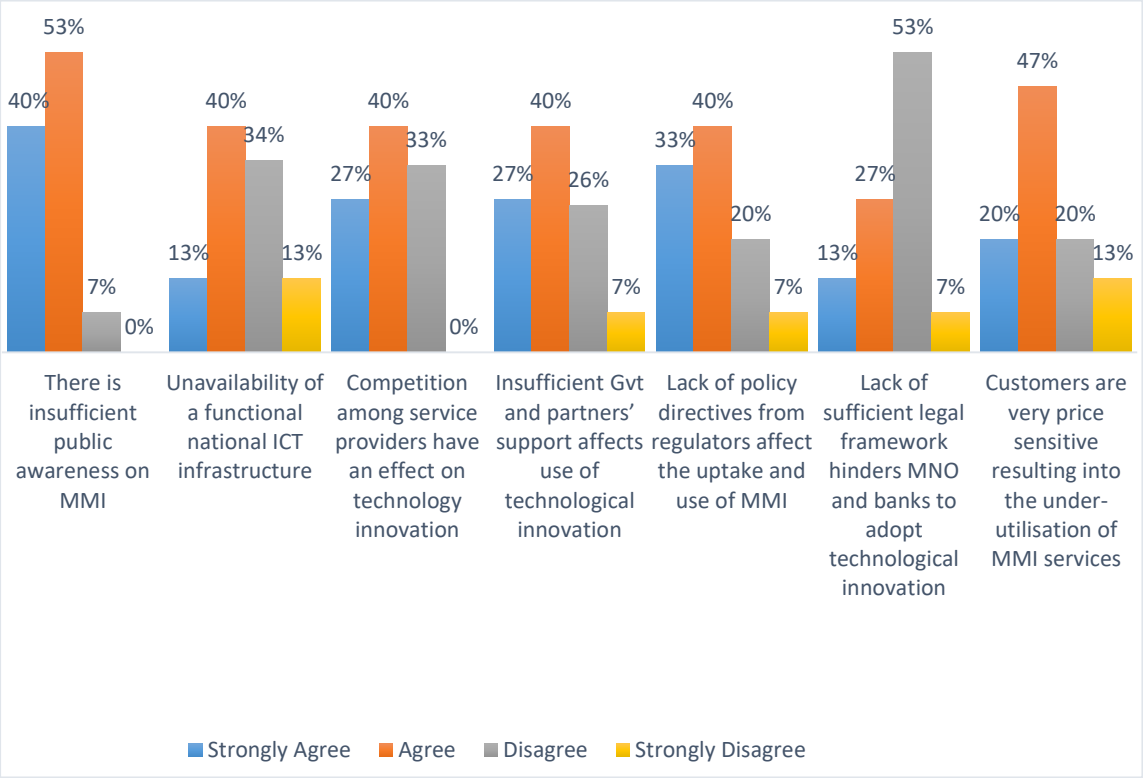

Figure 4.5: Environmental Factors

Source: Author's field data

4.2.2.1 Lack of sufficient public awareness on MMI

Awareness means whether a customer is aware of mobile financial service (Hinson, 2011), which can be a major determinant of adoption by customers (Ammar & Ahmed, 2016). It can also be a stepping stone to facilitate financial inclusion in developing countries (Ammar & Ahmed, 2016; Peruta, 2018). The results in figure 4.29 revealed that majority (93 percent) of respondents agreed to the fact that there is insufficient public awareness on MMI in Malawi. The results validated what was reported by mobile money users in section 4.3.1.1 and mobile money agents in this research. This study therefore found that lack of sufficient public awareness about MMI may be one of the reasons why Malawi experienced slow movements towards the adoption of MMI.

While a study by FinScope (2015) as cited in The Nation (2016) suggested that lack of awareness of financial products as one of the major drivers of low penetration levels of

financial inclusion, the GSMA (2009) mobile money annual report for the unbanked also cited awareness as a key driver to the adoption of mobile money innovation.

The results agree with the findings of a study by Combrink (2011) which revealed that all MNOs felt that lack of awareness is a major bottleneck to achieving mobile money success in rural Tanzania and increasing adoption among users. The results are also consistent with the findings of a study by Adeya (2003), also cited in Tsilizani (2015), who found that awareness regarding the potentials that exist in the use of mobile phones and ICTs was also lacking in Kenya and Ghana.

4.5.2.2 Unavailability of a functional national ICT infrastructure

Figure 4.29 shows that 53 percent of the respondents agree to the statement that adoption of Mobile Money Interoperability platform in Malawi was a challenge due to unavailability of a functional national ICT infrastructure. Interoperability was identified as one of the objectives in the 2011 mobile payment system guidelines developed to permit mobile network operators to provide mobile money services in Malawi. In view of this, Malawi's central bank in conjunction with the Bankers Association of Malawi (BAM), with funding from the World Bank, set up a national switch (Nat Switch) which was aimed at attaining the interoperability of auto-teller machines, point of sale devices, and all payment systems owned or operated by different banks or financial institutions, including mobile money service providers (Madise, 2014). The switch was launched in 2015 and has so far interconnected ATMs for all banks in Malawi. Surprisingly, by the time of writing this report, the switch has not been able to interconnect mobile money operators and banks. According to Madise (2014), lack of interconnectivity or integrated national switch through which mobile network operators can integrate with commercial banks' payment systems is one of the challenges hindering full achievement of financial inclusion in Malawi.

4.5.2.3 Competition among service providers

Majority (67 percent) of respondents in figure 4.29 agreed to the fact that competition among mobile money service providers and financial institutions have an effect on technology innovation. Service providers in Malawi compete in implementation of innovative solutions. This has affected the adoption of Mobile Money Interoperability platforms in Malawi.

The results are also in line with partnership in mobile financial services who published empirical data that supports the idea that where banks and MNOs perceive each other as competitors, any partnerships between the two are likely to be difficult (Flaming, Mitha, Hanouch, Zetterli &. Bull, 2013). Flaming et al. further reported that partners will be understandably wary of each other's long-term aspirations and they will likely not support and may even undermine any strategies that associate customer value with the other partner's brand. This was clearly demonstrated in the case of Safaricom and Equity bank in Kenya where both were competing for mass market customers with a large appetite for mobile financial services (Cook & McKay, 2017).

4.5.2.4 Lack of sufficient government and developmental partners' support

Results in figure 4.29 revealed that majority (67 percent) of employees from service providers who took part in this study agreed to the statement that lack of sufficient government and development partners' support have an effect on customers' willingness to use technological innovation. Technology innovation in this study is the adoption of MMI.

The results are consistent with the findings of a study by CGAP (2013) that identified and explored the relative importance of the key drivers of MM adoption. Given the lower probability of adoption among poor people, the study recommended specific campaigns targeting those MM users who have the characteristics identified as being important to drive adoption. The study cited a bulk payment strategy as being more effective for this (such as promoting government-to-person payments to be made over MM).

The finding also concurs with the finding of a study by Issing (1999) who supports that government should play a role in stimulating the adoption of new technology, through subsidies, standard setting and regulation because network effects may lead to excess inertia in the adoption of socially efficient payment systems. Commenting on the adoption of ACH systems in the US, Gowrisankaran (1998) argued against such a role by expressing that governments tend to pick the wrong technology and standard whereas Mantel and McHugh (2001) indicated that by selecting the wrong standard government may even prevent the adoption of the right standard by the private sector. Perhaps most outspoken on this topic is Weinberg (1997) who argues that market participants can always reach a sustainable network arrangement. However, the results

of this research established that service providers are of the view that government and development partners should take a leading role in promoting customers' willingness to adopt innovation.

4.5.2.5 Lack of clear policy directive from regulatory authorities

While majority (73 percent) of the respondents agreed with the statement that lack of regulation (clear policy directives) is one of the obstacles hindering the adoption and success of MMI platforms in Malawi, 27 percent disagreed with the statement.

The results support findings by Camner and Clark (2014) as reported in GSMA (2014) which reported that enabling regulation is key to unleashing market potential because it allows both the provider to build a functional distribution network to expand financial access, as well as allowing customers to adopt and use the service (Clark & Camner, 2014). The results also concur with the global adoption survey on mobile financial services that has consistently shown that 'of the fastest-growing mobile money deployments, the vast majority are driven by mobile operators, therefore from a regulatory perspective, one basic requirement for mobile money to succeed is to create an open and level playing field that allows non-bank mobile money providers, including mobile operators, into the market (Castri, 2015).

4.5.2.6 Lack of sufficient legal frameworks hinders MNO and banks to adopt technological innovation

Conversely, majority (60 percent) of participants in this study disagreed to the statement that lack of sufficient legal framework have an effect to the adoption of innovation; innovation in this study referred to MMI. MMI is still at an infant stage both in Malawi and in most developing countries as such very little information in known about it and the country's regulations do not touch much on it.

Cousins and Varshney (2014) argued that inter-operability has not yet been properly established within the mobile financial industry in developing countries. Based on the available literature, the researcher supports the idea that regulatory environment is in general a decisive factor that either facilitates or hinders the adoption of mobile final services, including MMI, in developing countries (Evans & Pirchio, 2014).

4.5.2.7 Customers are very price sensitive resulting into under-utilisation of MMI services

Figure 4.29 shows that 67 percent of the respondents agree to the statement that customers are very price sensitive resulting into under-utilisation of MMI services. Transaction cost is bound to effect the actual usage of mobile money (OMWANSA, 2012). This is also supported by a report by Diniz, Albuquerque and Cernev (2011) who stated that on the user side, the constraint may be the cost and price of devices and services; on the supplier side, the problem is the financial sustainability of the initiatives. This category also includes the difficulties of remaining price competitive for low-value transactions. Mobile money adoption and usage may therefore be driven by cost.

4.6 Opportunities of Mobile Money Interoperability

To better improve upon the user of mobile money transfer services, there is a need to formulate a report on opportunities and challenges of Mobile Money Interoperability platforms that enhance or hinder the adoption of mobile money transfer across mobile money service providers, including banks in Malawi. Mobile money transfer just like any other payment system is embedded with both opportunities and challenges. A2A interoperability in mobile money may create strong positive network effects; there is a wide body of research that investigates interoperability in payment systems and assesses the opportunity for participants that is created through network effects. Other studies have found empirical evidence that demonstrates the positive network effects of A2A interoperability between banks, which could apply also for mobile money services (eServGlobal, 2015).

4.6.1 Opportunities of MMI to mobile money users

The purpose of this study was to find to explore opportunities and challenges of Mobile Money Interoperability platforms that enhance or hinders the adoption of mobile money transfer across mobile money service providers, including banks in Malawi. This section discusses those issues that were mentioned as perceived opportunities of MMI to mobile money users.

4.6.1.1 MMI will increase accessibility of mobile money services

As highlighted in section 4.4.2 of this report, respondents to this study cited the following as some of the challenges affecting accessibility of mobile money services in Malawi; system challenges, restrictive/ prohibitive practices by service providers, transaction limits and problems associated with mobile money agents such as insufficient cash floats.

Addition to the above, users mentioned incidences like when an area do not have an agent for a particular service provider, users travel to a distance far looking for agents of their mobile money operator. Commenting on perceived opportunities of MMI, one respondent in Nthandizi, Bangwe said:

> *Our area, Nthandizi do not have any agent for TNM Mpamba but we have two Airtel money agents. Every time I want to send money to a customer on TNM Mpamba or l want to cash out money sent to me through Mpamba, I travel either to Limbe or Bangwe centre. The coming in of MMI in Malawi will help address some of these issues we face as customers in accessing mobile money services.*

Mobile money business greatly relies on agents to provide front-line commission based customer services but agents are allowed to conduct other kinds of businesses in addition to mobile money. The occurrence for them to struggle with liquidity problems arises because of the low commissions they make through mobile money business. Tsilizani (2015) found that mobile money agents are not able to provide enough float to serve customers satisfactorily.

The introduction of MMI enables customers on one network to be able to transfer money to a customer on a different network seamlessly. World-wide trends start to lean towards more open payment systems, it remains to be seen how mobile money in Malawi transitions into a more interconnected system. The recent launch of MMI in the country is a step in the right direction. Looking to the future, the expectation is to see interoperability of other facets of mobile money such as ‘the agent level’ and ‘merchant level’. While agent level interoperability permits agents of one service provider to serve customers of another service provider for cash-in and cash-out services, merchant level

interoperability allow users of any mobile money network to pay into a till that belongs to any mobile money operator.

As stated in literature review section of this report, agent level interoperability is possible even when there is agent exclusivity, as long as platforms are interconnected. According to Tarazi and Kumar (2012), agent exclusivity revolves around the ability of a customer of one provider to use the agent of another provider for cash-in and cash-out services related to that customer's account. By allowing any user from any mobile money network to have access to all the mobile money agents in the country for cash-in and cash-out transactions, agent interoperability will therefore expand financial access by providing more access points to a greater number of customers. Additionally, MMI has enabled customers to have wide channels to operate from. Some users opt to use banks' Auto Teller Machines (ATMs) to withdraw money, others may opt to send money to a different network and withdraw from an agent of a different network.

Countries where interoperability agreements are operational was as a result of the initiatives of the GSM Association (GSMA) and the Central Banks in making mobile money services more inclusive and accessible to more people (Estopace, 2016).

4.6.1.2 Increase effectiveness in mobile money business

Commenting on users' attitude towards accessibility of mobile money, respondents mentioned that MMI has greatly increased effectiveness in mobile money business. Respondents in the mobile money user category cited issues of persistent mobile money systems' challenges and inadequate cash floats among agents as some inefficiencies that affect users. While commenting on system challenges, one of the respondents in Blantyre explained:

> *Mobile money network is not very reliable as it keeps going on and off which makes it difficult for us customers to perform the transactions. Whenever I want to withdraw money from mobile money at agents, I am either told the system is down or the agent don't have enough money to serve me. I am then directed to another agent for assistance.*

Now that mobile money systems interoperate, customers have wide channels to operate from and services providers will always make sure that their systems are always up and

working. In events when mobile money systems will experience outages, service providers will ensure services are restored so that they should not lose business to competing provider. Eventually, interoperability with banks, agents and merchants shall make payment systems in Malawi fully open, efficient and affordable, thereby bringing down the costs of payments in the market, especially for the poor and informal businesses. The idea is supported by Tarazi and Kumar (2012) who stated that MMI would increase efficiency in mobile money transfer.

4.5.1.3 MMI would reduce transaction costs

Two participants to this research independently corroborated that mobile money services are costly to access and that service providers add probative costs to them. The research therefore found that MMI help in cost reduction for mobile money users to access mobile money and banking services and that MMI provide alternative cheap channels to access the services. One respondent narrated:

> *We travel long distances to send or receive money to or from another user on a different network whose agent is not available in our area. This make us to spend a lot of money on transport to access mobile money services.*

Consistent to this, a study by Donner (2005) also cited in Tsilizani (2015) found that mobile money enhances productivity and promotes efficiency among the users in the developing world since it reduces logistical costs because the service increases reach, ability and mobility apart from increasing income.

Commenting on the probative costs imposed by service providers on mobile money users, one respondent said:

> *We wonder why MNOs impose a fee on us every time we want to withdraw our own money through their agents. To make matters worse, the fee charged is directly proportional to the amount one withdraws the higher the amount one withdraws, the more the fees one is deducted.*

In the above narration, the customer shared the experience on how service providers monopolise mobile money business by charging prohibitive transaction fees which discourage user to withdraw money through mobile money agents.

This concurs with a report by CGAP (2012) that reported that MMI will help lower prices for consumers. Farrell and Saloner (1985) also argued that consumers would benefit from a direct network externality in the sense that one consumer's value for a good increases when another consumer has a compatible good. The researcher, therefore conclude that this relate be a direct-physical-effect explained by Katz and Shapiro (1985).

4.6.2 Opportunities of MMI to mobile money Agents

As discussed in section 2.3 of this report, mobile money agents are people or business contracted to facilitate mobile money transactions for users. They provide front-line customer services and other mobile money services which enable them earn commissions for performing these services. This section discusses issues that were mentioned as perceived opportunities of Mobile Money Interoperability to mobile money users.

4.6.2.1 MMI will help attract more business for Agents

Agents who took part in this research reported that they would be interested to serve customers of different service providers because doing so would attract more business for them. Commenting about MMI, a participant said:

> *I would be interested to serve customers with mobile money accounts from other providers for that will attract many customers to my business. I can testify this with a practical example; previously l used to serve customers on Zoona, my business grew.*

The results are consistent with the findings of market survey commissioned by IFC which found that agents are primarily interested in being interoperable because they believe it would help them attract more business (Musa, Niehaus & Warioba, 2014). The study also found a large proportion of users who said they would use mobile financial services more often if they could cash in and cash out at any agent (Ibid).

4.6.2.2 MMI will help agents to manage liquidity problem

Users to this research reported that lack of adequate capital in terms of cash floats by mobile money agents renders mobile money agents ineffective to assist customers

satisfactorily(as discussed in section 4.3.2 of this report). Commenting on additional gains that MMI will bring to agents, one agent reported:

> *"Agent interoperability would benefit us in the sense that it will enable us to maintain a single float when serving customers of different networks. In the future this could possibly be expanded to include bank agents as well".*

The results are supported by a study by Musa, Niehaus and Warioba (2014) who found that mobile money users were visiting multiple agents to do cash in or cash out but the coming in of MMI eliminated the problem due to the possibility of improved agent liquidity management; MMI would help agents to easily manage liquidity and e-float.

4.6.3 Opportunities of MMI to Service Providers

Service providers in mobile money business include Mobile Network Operators (MNOs) and financial institutions. MNOs provide mobile infrastructure and customer base whereas financial institutions provide physical custody of cash. This section discusses in details issues that were mentioned as perceived opportunities of MMI to service providers.

4.6.3.1 Increase in the number of transactions made in participating schemes

Service providers who took part in this research reported that MMI increases the number of daily transactions. Commenting on the impact of MMI, one participant from the service providers' category said:

> *"Mobile money interoperability encourages existing customers to transact more. This has a very positive results to business for in terms of revenue. The more customers transact, the more revenue from fees our company makes."*

The above narration clearly shows that increase in number of transaction in turn leads to increased transaction revenues. This finding is supported by Camner and Clark (2014) who reported that interoperability adds the ability for customers to transact with users in other schemes thereby increasing the size of the overall payments network. Metcalfe's Law, a principle dating back to the communications networks of the 1980s,

stated that the value of a network grows at the square of the number of connected users. A similar rationale implies that DFS interoperability has the potential to grow the volume of transactions by better connecting existing customers. This finding also supports research by Ovum (2010) which found that transaction volumes in any network is proportional to and driven by the number of interconnections between subscribers.

4.6.3.2 MMI will help increase in transaction revenues for MNOs

Most participants who took part in this research reported that increasing mobile money transactional will lead to an increase in transaction revenues for mobile network operators. According to one respondent from Airtel Malawi, when Airtel money started to interconnect with banks, the number of users increased and transaction revenues improved. This view was also supported by an employee from TNM Mpamba who said:

> *"MMI extends the electronic money loop which persuades many users to transact more enabling our revenues to grow."*

The above results are consistent with findings of Camner and Clark (2014) who also reported that the increased mobile money transactional leads to an increase in transaction revenues. Empirical studies have helped confirm the existence of the positive effect of network externalities for several types of banking sector payment networks, including ATM networks, Automated Clearing House (ACH) and credit and debit payment cards (Leibbrandt, 2004).

4.6.3.3 MMI will Increase the addressable market size for mobile money

Some respondents reported that MMI increases the addressable market size for mobile money business. Commenting on how MMI affect the overall mobile money market, one respondent from the service providers' category narrated:

> *"Since the introduction of MMI, a number of billers have shown interest to interconnect with our mobile money service. Consequently, the news brought excitement to our customers making them to transact more than ever before."*

This is supported by study by CGAP (2017) which proved that interoperability may bring entirely new customers into the DFS ecosystem. As the scope and scale of

networks expand, the overall value proposition of DFS also improves and attract untapped customer segments. Quite simply, the more you can do with mobile payments, the more people are likely to want to use them (Cook, 2017). The finding is supported by contribution made by Katz and Shapiro (1985) towards network externalities theory.

4.6.4 Opportunities of MMI to Nation

A lot of global research on mobile money has focused on the impact of mobile money services on microeconomics and macroeconomics outcomes. Mobile money serves as a tool for economic development. We discuss in this section issues that were mentioned as perceived opportunities of MMI to the economy of the nation.

4.6.4.1 MMI will promote Digital Financial Service (DFS)

Respondents to this research indicated that MMI may offer greater value by promoting the use of Digital Financial Service (DFS) beyond remittances. Bill payments and retail payments were some of the user cited examples. One respondent narrated:

> *I have an account at National Bank of Malawi, but the bank's mobile banking service do not allow us to pay GoTV subscription which customers on TNM Mpamba does. With the introduction of MMI, I transfer some money from my account at National Bank into my TNM Mpamba wallet and use the Mpamba wallet to pay my GoTV subscription.*

The above narrative testifies how the adoption of MMI is promoting the use of DFS. A lot of literature recommends that MMI increases cashless transaction volumes for a country. Transactions that may have previously been made using cash can move more easily to digital. This has a very positive effect as it helps to reduce expenditure in printing new bank note for central banks as reported by National bank's head of strategic marketing and corporate affairs, Wilkins Mijiga (The Daily Times, 2017). This will also help government track on mobile money transactions thereby assist in tax collections and curb issues of money laundering. The finding is supported by Cook and McKay (2017) who found that interoperability helps to create the efficiencies and scale in DFS that make the other benefits of going digital possible. Service providers are attempting to grow merchant networks as their proprietary networks work against them.

The sheer scale needed for merchant acceptance may make DFS retail payments a difficult end-game without effective interoperability (Cook & McKay, 2017).

4.6.4.2 MMI will help accelerate financial inclusion.

Respondents to this research reported that MMI will help accelerate financial inclusion for the majority unbanked in Malawi. In countries where mobile money services are created and scaled as closed-loop networks, they fail to deliver pro-poor elements of digital payment systems, thereby negatively impacts on financial inclusion. A lot of literature report that in countries where there has been successful penetration of mobile money interoperability services, there has been an increase in financial inclusion. One respondent said:

> "*Mobile phone network coverage is still an issue in most rural parts of Malawi. It is therefore a rare opportunity to find an area that is covered by all networks. As such, I don't find any reason why l should register on any mobile money service whose usage shall be limited to only one service provider".*

Another participant commented:

> *"Mobile money services are expensive hence I am not motivated to either register or use them".*

While financial regulatory authorities in Malawi are on campaign to encourage people to adopt mobile money service, recipients in the above narrations shared their perceived challenges that hinders them to adopt mobile money services. Tanzania implemented regulations promoting interoperability across mobile money networks (Roberts, MacMillan & Lloyd, 2016). Studies have found that competition in Tanzania grew following these regulations which resulted into lower prices and higher mobile money subscribers, which are important for financial inclusion (Mazer & Rowan, 2016; Roberts, MacMillan & Lloyd, 2016). The literature concurs with CGAP (2012) and FSDT (2013) who also reported that MMI increases financial inclusion and that the rate of financial inclusion grew in Tanzania from around 16 percent to close to 58 percent because of MMI.

Supported by the available literature, this research concludes that opening up to interoperability may encourage users to adopt mobile money services thereby contribute to the acceleration of the much talked about financial inclusion in Malawi. The idea is also supported by a media comment by the Zimbabwean ICT Minister, Supa Mandiwanzira who demanded that mobile money platforms in Zimbabwe be interoperable by April 1st, 2018 citing MMI would help boost financial inclusion and ease transaction hurdles (Karombo, 2018).

4.6.4.3 Improve the sustainability of mobile money services

Respondents from the service provider's category reported that MMI will improve the sustainability of mobile money services. This is supported by EseryGlobal (2015) who stated that lack of interoperability has been highlighted as a major barrier to the development of the mobile money market. Commenting on the reason why TNM Mpamba adopted MMI, one respondent said:

> *"The strongest reason for adopting interoperability was to increase daily transactions that would result in increasing revenues. This was difficult in a situation where mobile money transactions were only performed between users of the same scheme (network)."*

Mobile money to be sustainable, there must be sufficient demand from consumers and firms, a variable missing in many contexts (Donovan, 2012). As discussed in section 4.5.3.3 of this report, interoperability may bring entirely new customers into the DFS ecosystem. As the scope and scale of networks expand, the overall value proposition of DFS also improves and attract untapped customer segments (Cook, 2017). According to Donovan (2012), mobile money industry exists at the intersection of finance and telecommunications. It has a diverse set of stakeholders, with players from different fields in competition. These include Mobile Network Operators, banks and increasingly new entrants, such as mobile payment firms, who continue to catalyse the industry with innovative offerings.

4.7 Challenges of Mobile Money Interoperability

While Mobile Money Interoperability is expected to offer benefits to users, agents, service providers and at national level, its adoption faces several challenges. We discuss

in this section issues that were mentioned as perceived challenged of MMI to mobile money users, agents and service providers.

4.7.1 Challenges to Mobile Money Users

4.7.1.1 Less literate people are may find difficulties to use MMI

Respondents reported that the less literate Malawians, most of whom live in rural areas, may find MMI processes difficult to use. Commenting on what people in rural areas would say if MMI was offered to them, one informant had this to say:

> *"The application of mobile money services requires someone with basic knowledge of reading and counting. Levels of literacy are low in Malawi hence majority of Malawians who live in rural areas cannot successfully operate such innovations in mobile money services."*

The above finding is supported by findings of Zhang et al., (2012) who stated that people with formal education tend to have diverse and extensive financial knowledge. And According to Innovation Diffusion Theory (IDT) by Rogers (1995), educated people are one of the first people to adopt an innovation. This result is consistent with the findings of Nyirenda (2012) who also found strong relationship between education and adoption of an innovation. It is therefore agreed that less educated people may find MMI processes to be difficult.

4.7.1.2 MMI will increase transaction fees

Transaction cost for mobile money comes in the form of withdrawal fees or fees users are charged for transferring funds from one account to another. Respondents to this research reported that cost in terms of transaction fees may increase once MMI is fully adopted. One of the respondents from mobile money users testified:

> *"My fear is, once this technology is fully adopted, mobile money operators will introduce exorbitant transaction fees at the expense of us, poor Malawian."*

The researcher wanted to know the reasons behind the respondents view on MMI leading to increased transaction fees. Respondents from mobile money users' category cited profitability as the major reason behind this. Users feel services providers are

business oriented hence they introduce service fees in order to maximize the profits they make on every transaction. While mobile money agents shared the same views as users, respondents from the service providers were of the view that high fees charged on transactions were as a result of interconnect cost. One informant narrated:

> *You will agree with me, for us to be able to serve customers better and to sustain our business, we corroborate with other companies who charges a small fee on every transaction they provide to our users. The only challenge we discovered is, customers are very price sensitive.*

The results are consistent with the 2014 IFC market survey that found that customers were not willing to pay extra fees to use mobile financial services to send money to any network. Another study by Holloway, Rouse and Cook (2017) highlighted that the fees paid (cash in and cash out) on 21 mobile money service across 7 countries (Kenya, Uganda, Tanzania, Pakistan, Nigeria, Bangladesh and India) were regressive in structure because the larger a consumers transaction, the less the transaction fees they pay in percentage terms. Malawi was not included in above study, hence this research was curious to know how this translates to the structure of mobile money prices in Malawi. Considering each network combination and their transfer plus cash out fees, mobile money products in Malawi are regressive in structure too. This shows with the average fees paid downward trend as the amount increases. This means that at lower amounts, users are paying more in fees in percentage terms compared to higher amounts. Digital financial services, such as mobile money, have the potential to provide the poor with affordable access to formal financial tools. However, regressive price structures might limit the potential benefits for this segment of the population.

4.7.1.3 Technical Challenges

Availability of network is the engine of the mobile money service since its availability largely influences the ability of users to carry out transactions. As discussed in section 4.3.2 of this report, 70 percent of respondents agreed to the statement that the existing mobile money transfer platforms experience a lot of system challenges. Respondents perceived the adoption of MMI to increase mobile money system outages in the country. One respondent among the mobile money users narrated:

"Technical challenges with one services provider will affect all service providers, hence customers will be affected".

The above narrative testifies that system challenges with one service provider will affect all service providers whose platforms will be connected to it, causing delays in mobile money transactions, thereby affecting a number of successful transactions in that period, in that way affecting customer satisfaction. Some respondents were concerned with the resolving of system challenges at the operational level; they reported that technical outage issues may take time to be resolve because more than one service provider will be involved.

Customer experience remains critical for interoperability to scale. If the customer journey is overly compromised, customers will continue to find alternative solutions for cross-net transactions, either reverting to cash or a multi-SIM solution (Bindo, 2015). The results are consistence with a finding by Tsilizani (2015) who also found network problems and unavailability of services as common deterrents and challenges encountered by mobile money users.

4.7.2 Challenges to Mobile Money Agents

4.7.2.1 Reduced agents commission

MNOs have developed extensive agent networks to facilitate cash-in and cash-out transactions by converting physical money to eMoney and vice-versa for mobile money customers. Agents earn commissions on various transactions carried out by mobile money users. Respondents to this study were therefore of the view that MMI will enable users to directly transact on their phones without going through agents. Subsequently, daily transaction level for agents will begin to decline which will reduce commissions' agents receive per transaction per day.

"I fear MMI may drive a lot of mobile money agents out of business because our business is driven by volumes of transactions we conduct each day."

The above narrative signifies that many agents may lose their business hence increase the rate of un-employment in Malawi. Mobile money agents are a key element for

branding and education which reinforce marketing communications and the customer journey in mobile money business (McGrath, 2015). Losing them may therefore create knowledge gap for mobile money services in the country.

4.7.3 Challenges to service providers

4.7.3.1 Opening up to interoperability implies some surrender of market share

Respondents from service providers' category who took part in this research were of the view that opening up to interoperability implies some surrender of market share to smaller operators and perhaps banks. One service provider respondent indicated that:

> "*Leading mobile money schemes may not be keen to open their solutions to other service providers and make their services accessible to customers who are not registered as their subscribers."*

Specifically, one respondent from the service providers' category indicated that the organization considers;

> *the degree to which the activity contributes to the overall profitability of the firm, the degree to which the activity is integrated within the firm and the degree to which the activity enables the firm to differentiate itself from its competitors in the process of making the outsource decision.*

The analysis of the findings from the above narratives indicate that leading service providers may not be interested to interconnect their services with other service providers. When the researcher probed for the reasons why some service providers were reluctant to join the interoperability network, service providers reported that MMI could be a threat to competitive advantage hence surrender of their market share which could result into a reduction of their profits. These findings agree with the analysis of EseryGlobal (2015) who established that in some countries where there are dominant service providers, they may be reluctant to support interoperability. Kumar and Tarazi (2012) also cited less profitability as a key challenge of MMI.

4.7.3.2 Investment and operational costs

Participants from service providers' category reported investment cost as another challenge to the adoption of MMI. They mentioned that their organizations considers:

> *"The cost of infrastructure, marketing and branding of the new services"*

And

> *"Based on the models adopted, as service providers we are sensitive enough to the aadditional transactions costs added by commercial third party"*

The above narratives indicates that adoption of MMI may draw additional investment and operational costs for service providers. Although mobile money has been making quick inroads globally, Tsilizani (2015) study found that its adoption is not without challenges which include investment cost, among other challenges. This concurs with GSMA literature that reported that increasing costs for implementing and operating compatible systems is one of the barriers to the adoption on MMI (Clark & Camner, 2014). In the same report, Clark and Camner (2014) stated that banks with large numbers of customers are reluctant to join networks, worrying substitution costs outweigh the positive network effects (ibid). This was also mentioned by Chris Chirwa, a contributor to a feature in one of Malawi's daily newspapers, *The Daily Times*, who reported that 'Cost' is one of the challenges hindering great and exciting initiatives and innovations, including financial inclusion (The Daily Times, 2016). Chirwa reported that most financial services rely on technology one of the challenges in Malawi is the high costs of technology. Since Mobile Money Interoperability is part of innovations in mobile computing, the research therefore attributes the challenge of cost as a contributing factor to the country's slow rate in adoption of MMI.

4.8 Summary of findings

Investigating on demographic profile of mobile money users in Blantyre and Limbe, the study found that all were Malawians, which conform to the requirement of this research which was specific to Malawian context. Majority were men and whose ages were between 30 -39 years. Majority of the respondents had attained at least secondary education which is equivalent to ordinary level. This can be associated with the adoption rate of the respondents in the study area. Probably, the application of the mobile money requires some with basic knowledge of reading and counting to successfully operate mobile money services. The largest percentage of participants

mentioned business as their source of income. Business people have satisfactory lamp some of money on hand, either they receive from sales or they want to use direct on purchasing goods. The intention to use mobile money or bank services is therefore high for these groups of people. Majority of participants were registered on TNM Mpamba and that they did not own an account at any formal financial institution (Bank). Thus, most of their financial transactions were through mobile money services.

Demographic profiles for mobile money agents were analysed and their results revealed that there majority were Male, aged between 40 to 49 years. The target for respondents in this category was to have more owners as opposed to employees responding to the questionnaire, and this was achieved because a significant 75 percent of the respondents in this category were the business owners. Majority had attained secondary education level, and had their business premised in Limbe. Majority reported that they have been in this business between 5 to 10 years.

Demographic profiles of respondents in service provider category revealed that majority were employees of Telekom Networks Malawi (TNM) Pcl and male dominated. Majority were aged between 30 and 39, and holders of university degree. Majority had 3 to 5 years work experience and mobile money was core to their day to day work.

Results for current status of MMI platforms in Malawi based on mobile money users' knowledge, source of information, experience and opinions revealed that respondents had widespread knowledge of mobile money services. On further enquiry into mobile interoperability services, it was established that only a few respondents have ever used MMI products or services. Many Malawians were not even aware of the existence of these services. The results, therefore validates the fact that most respondent neither knew nor never used MMI services. Regarding respondents' opinions, the research found that all the respondents (100 percent) were of the opinion that other people would be interested to see Malawi achieving full interoperability of mobile money platforms, 96.8 percent were of the opinion that Malawi should achieve full adoption of MMI, both 95.2 percent and 93.5 percent of the respondents agreed that rural and urban settlers respectively would be satisfied if Malawi fully adopt MMI. When asked if Mobile money agents had knowledge about MMI, the above results confirmed that only very few agents had knowledge about the existence of Mobile Money Interoperability

services. To validate the above results, respondents from the service providers' category reported they offer one MMI service, and they mentioned the following as key players in the implementation of Mobile Money Interoperability solution; users, MNOs, Financial institutions and regulatory authorities (MACRA and RBM).

On examining how existing mobile money service platforms' affects usability and accessibility of mobile money services, the results revealed that most users felt the existing mobile money transfer are easy to use, they satisfy their needs, transactions made with mobile money are secure, compared to bank process, documentation processes for mobile money are fair and mobile money saves on time for them. However, our analysis revealed that a large proportion of population still has difficulty using mobile money.

Users' attitude towards accessibility of existing mobile money platforms revealed that mobile money are convenient to access, however lack of adequate capital in terms of cash floats by mobile money agents renders mobile money agents ineffective to assist customers satisfactorily. Respondents reported that said maximum deposit allowable by operators is enough and that mobile money experiences a lot of system challenges. Respondents strongly agreed to the statement that mobile money service providers add restrictive practices or probative costs to payment schemes. Finally, respondents did not agree to the statement that maximum deposit allowable by mobile money operators is enough.

Supply side analysis of service providers' perceived opportunities and challenges revealed that the adoption of MMI will increase transactional revenue, increase the market size in terms of customer base and transaction revenues for mobile money business, MMI will broaden mobile money eco system, opening up to interoperability implies some surrender of market share to smaller operators and perhaps banks and that MMI breeds mistrust and profit-sharing ratio disagreements between MNOs and/ Banks. Our analysis on environmental side in Malawi revealed that there is insufficient public awareness of MMI, the adoption of MMI was a challenge due to unavailability of a functional national ICT infrastructure, competition among service providers have an effect on the adoption of MMI, there is lack of sufficient government and developmental partners' support in promotion of MMI, there is no clear policy directive from regulatory authorities on MMI, lack of sufficient legal frameworks hinders MNO

and banks to adopt technological innovation. Finally customers are very price sensitive resulting into under-utilisation of MMI services.

Conclusively, the following were mentioned as opportunities of MMI: Increase accessibility and effectiveness of mobile money business and reduce transactional costs for mobile money users, attract business customers and improve liquid management for agents, increase the number of transactions, transaction revenues and addressable market size for service providers and promote DFS, accelerate financial inclusion, and improve the sustainability of mobile money services in the country. The following were mentioned as key challenges of MMI: less literate peoples may find MMI processes difficult to use, MMI may increase transaction fees charged on users, technical challenges, reduced agents' commissions, and threat to competitive advantage that may come because of surrender of market share and reduced profits for service providers, and finally investment and operational cost for service providers may go up.

4.9 Chapter Summary

This chapter presented findings of the study and discussed the findings. The research findings showed that both Airtel Money and TNM Mpamba inter connected their services with commercial banks in Malawi. However, most users of mobile money services are not fully aware of the existence of these services. The research revealed that users, MNOs, Banks and regulatory authorities as key players in implementation of MMI solutions and that there are barriers towards the adoption and successful future of MMI in Malawi. However, the research discussed some opportunities that Mobile Money Interoperability can bring to users of mobile money, mobile money agents, service providers and the nation at large. The next chapter concludes the thesis by reviewing the objectives of the study, direction for future research and what needs to be improved for successful adoption of MMI.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter provides the study summary of finding, conclusions and suggests recommendations based on the study results. The entire study targeted mobile money users, mobile money agents and service providers. Data was collected and analysed descriptively with the use of frequency tables, percentages, and charts. Self-filled questionnaires and semi structured interviews were main instrument and method used to collect data. The study focused on exploring opportunities and challenges of mobile money interoperability platforms that enhance or hinders the adoption of mobile money transfer across mobile money service providers, including banks in Malawi. Specifically, the study wanted to identify the current status of mobile money interoperability platforms in Malawi; to examine how existing mobile money platforms affect accessibility and usability of mobile money services - demand side analysis; and to explore opportunities and challenges of Mobile Money Interoperability platforms to providers and enabling institutions - supply side analysis. A total of 89 out of 100 who were contacted took part in the study, representing 89 percent response rate. Conclusions and recommendations emanating from this research are presented in this chapter summarise findings on each research objective and proposes areas for future research.

5.2 Review of Study Objectives

The main research objective was to explore opportunities and challenges of Mobile Money Interoperability platforms that enhance or hinders the adoption of mobile money transfer across mobile money service providers, including banks in Malawi. In order to draw well-thought conclusions for the study, the following specific research objectives were set:

- To identify the current status of Mobile Money Interoperability platforms in Malawi.
- To examine how existing mobile money platforms affect accessibility and usability of mobile money services – demand side analysis
- To explore opportunities and challenges of Mobile Money Interoperability platforms to providers and enabling institutions - supply side analysis.

Based on the results of the study discussed in the previous chapter, the following key findings were made:

5.2.1 Current status of mobile money interoperability platforms in Malawi

On the current status of MMI in Malawi, the study has shown that Airtel Money got connected to FDH bank in September, 2014, OIBM bank in 2016 and FMB bank in 2018 whereas TNM Mpamba got connected to FMB bank in July, 2017, National Bank of Malawi (NBM) in June, 2018, FDH bank in August, 2018 and Finca, a microfinance institution (MFI) in October, 2018. The study further revealed that TNM Mpamba got connected to Airtel Money in 2018. TNM Mpamba and FMB bank partnership enables customers on Mpamba to withdraw money from their mobile wallet at any FMB Bank automatic machine (ATM). All other bank - MNO partnership allows mobile money users to send or receive money to or from a bank account to their mobile wallet. Airtel money customers can obtain a loan from FDH Bank using their mobile wallet.

The study revealed that most users of mobile money services in Malawi are not aware of the existing Mobile Money Interoperability services. Lack of sufficient public awareness on mobile money interoperability (MMI) services in Malawi would make users to be unfamiliar with the technology, uncertain of its benefits and lack guidance. The research further revealed that users of mobile money services, Mobile Network Operators (MNOs), financial institutions and regulatory authorities (MACRA and RBM) are the key players in implementation of Mobile Money Interoperability solutions in Malawi.

5.2.2 How existing mobile money service platforms' affects accessibility and usability of mobile money services

The findings on the second objective of the study showed that the existing mobile money transfer are easy to use, they satisfy users' needs, transactions made with the existing mobile money are secure. Furthermore, documentation processes for mobile money are fair compared to bank process and mobile money saves on time for them. The analysis revealed the following issues as negatively affecting usability and accessibility of the existing mobile money platforms: problems of mobile network instability (technical/ system challenges), lack of adequate capital in terms of cash float by mobile money transfer agents, the maximum allowable amount per transaction and the prohibitive costs or restrictive practices imposed by service providers. Even though the results revealed that all factor components of adoption of mobile money were significant predictors of usability and accessibility, satisfaction and systems challenges were found to be the most significant predictors of usability and accessibility respectively.

5.2.3 MMI opportunities and challenges of providers and enabling institutions – supply side analysis

On the third objective, the study revealed the following as opportunities to MMI: Opening up to interoperability may increase accessibility and effectiveness of mobile money business and reduce transactional costs for mobile money users; MMI may attract more customers for mobile money agents and improve liquid management them; MMI may increase the number of transactions for mobile money service providers hence increase transaction revenues made from mobile money; MMI may increase the addressable market size for service providers and promote the use of Digital Financial Services (DFS); MMI may accelerate rate of financial inclusion in Malawi; and MMI may improve the sustainability of mobile money services in the country.

The study identified the following as key challenges of MMI: Firstly, most Malawian would find MMI difficult to use because the rate of literacy levels are considered low for many Malawians. Secondly, MMI may increase transaction fees charged on users. Customers are very price sensitive as such service providers should understand that increasing service fees charged on transactions may lead into customer under-utilisation of MMI services. Thirdly, technical challenges that arise from network outages was

identified as another challenge that may hinder the full adoption of MMI. Considering that mobile money is a network-base money transaction, service providers should understand how mobile money users may lose trust on the performance of the network hence churn to competing service providers. Fourthly, MMI will enable users to directly transact on their phones without going through agents, transaction levels for agents may begin to decline which may reduce commissions agents receive. Consequently, agents may lose their businesses rendering them employed hence unemployment rate for the country may rise. Fifthly, opening up to interoperability may imply some surrender of market share to other service providers. This is a threat to competitive advantage and may result to a reduction of profits for service providers. Finally, investment and operational cost for service providers may go up. Service providers may resolve to pass on the costs to users which may lender mobile money services expensive to users.

5.3 Practical Contribution

The primary focus of this study was to explore opportunities and challenges of Mobile Money Interoperability platforms that enhance or hinders the adoption of mobile money transfer across mobile money service providers, including banks, in Malawi. It was found that interoperability across network money transfer has been achieved in Malawi and the country has adopted banks' and mobile money operators' interoperability solutions. The current situation allow mobile money users to directly transfer money between TNM Mpamba and Airtel Money without visiting multiple agents to make transactions. In addition, mobile money users are able to directly send money from their mobile wallet to bank account and also to directly receive money from bank account into their mobile wallet.

Service providers in Malawi are promoting MMI as being cost effective and flexible. This study however reveals that mobile money interoperability may increase transaction fees for users; users may be paying more on transaction fees as compared to what they were paying as transaction fees before the adoption of MMI. Currently, for a user to transfer money from a bank account to mobile wallet, the bank charges a transaction fee. When the user wants to withdraw the same amount via a mobile money agent, the mobile network operator also charges a transaction fee on the user. This has created a scenario whereby mobile money users are now charged transaction fees twice for a single transaction. Similar, where a user wants to transfer money to another user

on a different network, the transaction fee charged is much higher as compared to a scenario where the same amount was transferred to a user on the same network.

5.4 Recommendation

This section outline the suggested recommendations based on the opportunities and challenges that enhance or hinders the adoption of MMI.

Lack of sufficient public awareness of mobile money interoperability in Malawi was a major concern from both mobile money users and agents. Considering that lack of awareness and cost (Clark & Camner, 2014) are crucial elements in the general adoption of ICT, it is a common occurrence that users will be unfamiliar with the technologies, uncertainty of its benefits, and will lack guidance (Giovanni & Mario, 2003); (Barua, 2005); (Premkumar & Roberts, 2008). The study, therefore recommends to service providers who are currently offering interoperable services in Malawi to intensify marketing campaign aimed at providing sufficient public awareness on the existence of Mobile Money Interoperability services they offer.

The results on the supply side revealed that service providers were not fully opening up to interoperability because of competitive threats as they are afraid of losing market share to competitors, profit sharing ratios disagreements and investment cost. This contravenes with Reserve Bank of Malawi (RBM) regulations on payment systems' interoperability. The study, therefore recommend regulatory authorities (both in financial sector and telecommunication industry) to:

- Propose viable commercial model options for interoperability solution that will help unveil the barriers that exist for MNOs and banks to join the mobile payment network. Interoperability between networks reduces the negative impact of network effects on competition.
- Enforce clear policy directives that would see the national switch building a functional distribution network to expand financial access, as well as allowing customers to adopt and use MMI service.

Furthermore, findings of this study revealed the problem of mobile network instability. Considering that mobile money is a network-base money transaction, it is a common

occurrence of facing transaction failures if the network poses a challenge. The study make the following recommendation to service providers:

- Improve their network so that mobile money users can build trust on the performance of the network.

Lack of adequate capital in terms of cash floats by mobile money agents was another key challenge that stood out from the findings of this study. Considering that mobile money business relies greatly on agents to provide front-line commission based customer service and that this group is allowed to conduct other kinds of business in addition to mobile money, it is therefore a common occurrence for them to struggle with liquidity problems. This study therefore recommend service provider to:

- Consider implementing agent-level interoperability solutions in Malawi. This will permit agents of one service provider to serve customers of another service provider for cash-in/out services related to customer account. As stated in literature review, this is possible even when there is agent exclusivity, as long as platforms are interconnected.

Finally, because mobile money transfer is driven by transaction volumes and competitive pressure, it is therefore a common occurrence for service providers to impose maximum allowable transaction limits and restrictive practices or prohibitive costs that limits users to fully utilise mobile money services. We therefore recommend service providers to

- Consider adjusting upwards the maximum allowable transaction limits.

5.5 Further Research

Firstly, this research utilised a mixed research approach method in which priority was assigned to qualitative data collection and analysis, it would be meaningful also to conduct a thorough quantitative research to assess the significance of the identified opportunities and challenges in Malawi.

Secondly, this research subjects have been of an urban setting, that are relatively educated. There is a need to conduct a similar research whose sample population would include people living in rural areas of Malawi.

Thirdly, another possible area for further research would be to identify and evaluate technical architecture needed to achieve interoperability in Malawi. Reviewing existing Mobile Money Interoperability technical solutions will ensure compatibility of those solutions with existing platforms in the context of Malawi. Mobile payments are managed by mobile network operator while mobile phone banking solutions are managed by banking institutions with support from a mobile network operator. Another research would therefore focus at technical implementation and its implications on users.

Fourthly, it would also be interesting to conduct another research looking critically at the macroeconomic effects of mobile money interoperability. The discourse in the field is mainly positive and optimistic and this thesis has also viewed MMI as a positive thing that will improve lives and result in alleviating poverty. However, as the view held by mobile money users that most Malawian would find MMI difficult to use because the rate of literacy levels are considered low for most users in Malawi, mobile money agents reported that MMI may drive a lot of them out of business thereby creating fears of an increased rate of un-employment in Malawi. Service providers were also of the view that MMI could be a threat to competitive advantage. Therefore, it would be interesting to investigate the darker sides of Mobile Money Interoperability on macroeconomic level by examining the unwanted effects that proponents do not want to see or acknowledge.

Lastly, this study focused on mobile money users, mobile money agents, MNOs and bank. Notably, merchants of mobile money systems have a crucial role to play also as well on the adoption of innovations in mobile money systems. It would therefore be essential to identify and evaluate commercial model options for interoperability. This would help unveil the barriers that hinders MNOs and banks from joining the mobile payment network and hence propose strategies to overcome such barriers.

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APPENDICES

Appendix A: Consent Form

Dear Respondent,

My name is **Humphrey Jalani**. I am pursuing a **Master of Sciences Degree in Informatics** program at **Chancellor College**. I am currently conducting a research project entitled "Opportunities and Challenges of Mobile Money Interoperability in Malawi''. Thank you very much for volunteering to participate in this interview.

The information gathered with this questionnaire is wholly for academic purpose and will be treated with utmost confidentiality. You will not receive any reward for participating in this study and you have the right to withdraw from this study at any time without penalty.

The outcomes of the study are anticipated to assist the understanding of the opportunities and challenges of Mobile Money Interoperability platforms that enhance mobile money transfer across mobile money service providers, including banks in Malawi'.

Thank you in advance for your participation.

☒ I agree to participate in this research project

☐ I have read this consent form and the information it contains and had the opportunity to ask questions about them.

☒ I agree to my responses being used for education and research on condition my privacy is respected, subject to

I understand that my personal details may be included in the research/ will be used in aggregation form only, so that I will not be personally identifiable.

☒ I understand that I am under no obligation to take part in this project.

☒ I understand I have the right to withdraw from this project at any stage.

Appendix B: Reference Letter

PRINCIPAL
Richard Tambulasi, B.A (Pub Admin), BPA (Hons), MPA, Ph.D

CHANCELLOR COLLEGE
P.O. Box 280, Zomba, Malawi
Telephone: (265) 524 222
Fax: (265) 524 046
E-mail: principal@cc.ac.mw

TO WHOM IT MAY CONCERN

Dear Sir/Madam,
15 September 2016

REFERENCE FOR MR HUMPHREY JALANI (MSC/INF/06/14)

As per the subject matter, this reference letter is provided at the written request of Humphrey Jalani registration number (MSC/INF/19/14) who is a student at Chancellor College pursuing an MSc in Informatics under the Computer Science Department. He has completed course work for his first year of study and is currently working on his thesis project. He is researching on "*Exploring Effects of Interoperability of Mobile Money Platforms In Malawi*"

Any assistance rendered to him for the same would be greatly appreciated.

Yours faithfully,

Kondwani Godwin Munthali (PhD)
Programme Coordinator, MSc Informatics
Kmunthali@cc.ac.mw – 0999387701 / 0884 112 001

Appendix C: RBM Response to permission to carry out research

RESERVE BANK OF MALAWI

TEL: (265) 1 770 600/771 600
FAX: (265) 1 772 752/774 289
WEBSITE: http://www.rbm.mw
EMAIL: reserve-bank@rbm.mw

HEAD OFFICE
CONVENTION DRIVE
P O BOX 30063
CAPITAL CITY
LILONGWE 3
MALAWI

15th December 2015

Mr Humphrey Jalani
C/o Billing Department
TNM, Livingstone Towers
P.O Box 3039
BLANTYRE.

Dear Mr Jalani,

RE: REQUEST FOR PERMISSION TO CARRY OUT ACADEMIC RESEARCH

Your letter dated 10th November 2015 on the above subject matter, refers.

We wish to thank you for taking interest to carry out research on interoperability of mobile money in Malawi. However, we wish to propose that the approval to carry out your academic research or an introductory letter which you can present to your target population during the survey should be obtained from Chancellor College as an institution responsible for the exercise.

We wish you success as you embark on this exercise. For detailed clarification, you may contact Mr Mushane Mwangonde, Manager - Oversight and Compliance Division, National Payments System Department on +265 999 353 101 or email mmwangonde@rbm.mw.

Yours Sincerely

Mr Fraser H. Mdwazika
DIRECTOR, NATIONAL PAYMENTS SYSTEM

Appendix D: Questionnaire to Service Providers

Section 1: Demographic profile of respondents

Instruction: Indicate your answer by ticking ☒ or choosing your response from the combo box on the spaces in front of the response options:

<table>
<tr><td colspan="2">Gender: Male ☐
Female ☐</td><td colspan="2">Organisation:
- Choose an item.</td><td colspan="2">No. of Years You have worked for this organisation:- between 3 to 5 years
between 3 to 5 years</td></tr>
<tr><td colspan="6">Age in Years: i. Between 20-29 ☐, ii. Between 30-39 ☐, ii. Between 40-49 ☐, ii. Above 50 ☐</td></tr>
<tr><td>Education level</td><td>Certificate ☐</td><td>Diploma ☐</td><td>University Degree ☐</td><td>Post Graduate ☐</td><td>Others (Specify) ☐ .....</td></tr>
<tr><td>Department</td><td>IT ☐</td><td>Billing ☐</td><td colspan="2">Mobile Money/ Banking ☐</td><td>Others (Specify) ☐</td></tr>
<tr><td colspan="2">How related is your work to Mobile Money/ Banking?</td><td colspan="4">Core ☐, Regular ☐, Sporadic ☐, Technical (Secondary ☐, Others (Specify) ☐ .....</td></tr>
</table>

Section II. Current status of A2A Mobile Money Interoperability platforms in Malawi.

1. What type of Account-to-Account (A2A) Mobile Money Interoperability platform products/ service do you provide? *(Please click inside the box)*

a) Allow our customers to push money to a bank from their mobile wallet ☐

b) Allow our customers to pull money from account at bank into their mobile wallet ☐

c) Allow our customers to push money to mobile wallet of a different MNO ☐

d) Allow our customers to receive money from mobile wallet of a different MNO ☐

e) Allow our customers to directly get a loan from an account at a bank ☐

f) Allow mobile money customers withdraw money from their mobile wallet using ATM☐

g) Others, please specify;.....

h) None of the above ☐

2. Who are the key players in adoption of Mobile Money Interoperability?

a) Financial institutions/ Banks ☐

a) Mobile Network Operators ☐

b) Reserve Bank of Malawi ☐

c) MACRA ☐

d) National Switch – Nat switch ☐

3. Are the following factors considered in your institution as challenges for the adoption of Mobile Money Interoperability? ***(Please circle)***

a) Protecting market-share ☐

b) Security risk ☐

c) Customers reluctance ☐

d) Cost ☐

e) Lack of competition ☐

a. Inadequate ICT infrastructure and skilled staff

f) Lack of staff motivation ☐

g) Others, Specify:

Section II: Statements related to Perceptions, challenges and plans of service providers in the adoption of Mobile Money Interoperability services. Please indicate level of your choice by clicking the spaces that specify your choice from the options.

Supply Side Analysis	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**
1. Adoption of Mobile Money Interoperability will increase transactional revenue.	☐	☐	☐	☐
2. Mobile Money Interoperability will increase the market size for mobile money business.	☐	☐	☐	☐
3. Adoption of Mobile Money Interoperability will increase mobile money eco system.	☐	☐	☐	☐
4. Lack of job advancements/ motivation hinders competent staff	☐	☐	☐	☐

to propose and advance technological innovation				
5. Opening up to interoperability implies some surrender of market share to smaller operators and perhaps banks (Short-term profit objectives)	☐	☐	☐	☐
6. MMI breeds Mistrust and profit-sharing ratios disagreements between MNOs and/ Banks	☐	☐	☐	☐

II. Environmental factors	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**
7. There is lack of sufficient public awareness on mobile money and mobile banking interoperability (MMI)	☐	☐	☐	☐
8. Adoption of MMI services between mobile money service providers and across the banks is difficult due to unavailability of national ICT infrastructure	☐	☐	☐	☐
9. Competition among mobile money service providers and financial institutions have an effect on technology innovation	☐	☐	☐	☐
10. Lack of sufficient government and development partners' support have an effect on	☐	☐	☐	☐

customers' willingness to use technological innovation				
11. Lack of policy directives from regulators affects the uptake and use of Mobile Money Interoperability platforms	☐	☐	☐	☐
12. Lack of sufficient legal frameworks hinders MNO and banks to adopt technological innovation	☐	☐	☐	☐
13. Customers are very price sensitive, which has resulted in the under - utilisation of Mobile Money Interoperability products/ services.	☐	☐	☐	☐

Thank you very much.

Appendix E: Questionnaire to Mobile Money Users

Section A. Basic Demographics. Please Tick [✓] where applicable.

<table>
<tr><td colspan="3">First Name:</td><td colspan="6">Surname:</td></tr>
<tr><td colspan="2">Residential Area</td><td colspan="2"></td><td colspan="4">Nationality: Malawian [ ]
Non Malawian [ ]</td></tr>
<tr><td colspan="2">Phone Number</td><td colspan="4"></td><td colspan="2">Gender: Male [ ] Female [ ]</td></tr>
<tr><td colspan="2">Age</td><td colspan="6">i. less than 20 years [ ], ii. Between 20-29 years[ ],
iii. Between 30-39 years [ ], iv. above 40 years [ ]</td></tr>
<tr><td>Education level</td><td>Primary [ ]</td><td>Secondary [ ]</td><td>Certificate [ ]</td><td>Diploma [ ]</td><td>University Degree [ ]</td><td colspan="2">Graduate school [ ]</td></tr>
<tr><td>Source of income</td><td>Young School leaver [ ]</td><td>Unemployed [ ]</td><td>Employed [ ]</td><td>Business [ ]</td><td colspan="3">Other (Specify) [ ]</td></tr>
<tr><td>Registered on Mpamba
Yes [ ]
No [ ]</td><td>Registered on Airtel Money:
Yes [ ]
No [ ]</td><td>Account at Bank:
Yes [ ]
No [ ]</td><td>NB</td><td>STD</td><td>ECO</td><td>FMB</td><td>FDH</td><td>NBS</td><td></td><td>Other</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Section B: Knowledge, Source of Information, Experience and Opinion about Mobile Money

Interoperability platforms in Malawi – Current Status.

1. Can you tell me what you know about Mobile Money Interoperability (MMI)?

2. What have you heard from other people about MMI?

3. Where did you hear about MMI?

   i. Radio advert { } ii. TV Advert { } iii. Interpersonal communication channels such as SMS {}

   iv. Targeted outreach communication activities{ } vi. Others specific:

   _____

4. Do you know anyone who have ever pushed or pull money to or from bank into his/her mobile wallet or withdrawn cash from his/her mobile wallet using any ATM**?**

   (Please tick). **i. Yes { } ii. No.{ }**

5. Have you ever pushed or pull money to or from the bank into your mobile wallet yourself or withdrawn cash from your mobile wallet using any ATM? ***(Please tick).***

i. Yes { } ii. No.{ } ***if Q.5 'No', then skip to Q.9***

6. Why did you decide to push or pull the cash? ***(Please tick).***

i. Bill Payment { }

ii. There was no agent for my mobile network provider { } iii. To save on time { }

iv. Mobile money Agent had no cash { } v. Technical problem with ATM { }

vi. Others specific: _____

7. Were you satisfied with the service? **Yes { } No.{ }** ***if Yes 'No', then skip to 9***
8. Why were you not satisfied?

i. Difficult to use { } ii. Transaction charge (fees) were too high { }

iii. It was not user friendly { } iv. Technical/ Network Problems { }

v. Others specific:

_____

9. Do you think people you know would be interested to see Malawi achieving Interoperability across network money transfer (between Mpamba and Airtel Money)? ***(Please tick your answer***) i. Yes { } ii. No. { }
10. Would you want MMI to be fully adopted in Malawi yourself? ***(Please tick your answer***) i. Yes { } ii. No. { } If no explain?_____
11. What are some ways MMI could help or harm a user in Malawian?
12. What would people in rural areas say if MMI was offered to them?
13. What about people in urban areas?
14. In your own opinion, what do you think are the opportunities and challenges of MMI?

Opportunities	**Challenges**

NB. If space is not enough, please use the back page

Part two, Use of Mobile Money Interoperability products

1 = frequently least once a month; 2 = **infrequently** less than once a month but at least once every three months; 3 = **occasionally** (less than once every three months); 4 = **Never; 5 = don't know**

		1	2	3	4	5
1.	Send or receive money from other people via TNM Mpamba, Airtel money or Zoona					
2.	Cash out (withdraw money) from TNM Mpamba wallet at FMB ATM					
3.	Pushing money from mobile wallet into a bank account					
4.	Pulling money from bank account into a mobile wallet					
5.	Acquiring a loan from the bank through TNM Mpamba or Airtel money					

Others, please specify any MMI products / services you know

……

Section C; Examining how existing mobile money service platforms' affects accessibility and

Usability of mobile money services

Instructions; Please tick ✓

Q. No.	***Usability Clue***	**Strongly Agree**	**Some How Agree**	**Disagree**	**Strongly Disagree**
6.	The existing mobile money platforms satisfy your needs				
7.	The existing mobile money transfer platforms are easier				
8.	The transactions made with mobile money are secure				
9.	Documentation processes are fair with mobile money transaction as compared to bank processes				
10	Mobile money saves on time and reduce waiting time in queue – convenient				

Q. No.	***Accessibility Clue***				
11.	Mobile Money transfer services experience a lot of system challenges				

12.	Lack of adequate capital in terms of float and/or cash money by agents affects users				
13.	Money transfer to another network or bank attracts additional costs				
14.	Mobile money transfer is convenient to access (7 days and 24 hour services)				
15.	Mobile money service providers add restrictive practices or prohibitive cost to payment schemes				
16.	Maximum deposit allowable by Mobile Money Operators is enough and affordable				

Thank You

Appendix F: Questionnaire to Mobile Money Agents

Malangizo*:*

M'gawo **A**: Mafunso ofuna kudziwa mbiri yanu.
M'gawo **B**: Mafunso ofuna kudziwa zimene mumaganiza za TNM Mpamba ndi Airtel Money

Gawo A: Mafunso ofuna kudziwa mbiri yanu

Mwamuna ☐ **Mkazi** ☐	**Ndinu Mzika Ya Dziko lino?** **Eya** ☐ **Ayi** ☐	**Mumapangira Business dela la kuti:** **Blantyre** ☐ **Limbe** ☐ **Malo ena(Lembani):……..**

Muli ndi zaka zingati: i. kuchepra 20 ☐. ii 20-29 ☐, iii. 30-39 ☐, iv.40-49 ☐, v. kupitilira 50 ☐

Maphunziro anu	Primary School ☐	Sekondale School ☐	Koleji ☐	Ukachenjede ☐	

Zaka zimene mwakhala mukupanga business iyi	Kuchepera zaka 2	Pakati pa Zaka 2 kulekeza 5	Zaka 5 kulekeza 10	Kupitilira zaka 10

	Business Yanga ☐, ndikugwira ntchito ☐, Others (Specify) ☐
	Kodi Ndinu Agent wa Network yanji? **TNM Mpamba** ☐, **Airtel Money** ☐

M'gawo **B**: Mafunso ofuna kudziwa zimene mumaganiza za TNM Mpamba ndi Airtel Money

1. Kodi munamvapo kapena kuona chitukuko chonga ichi chikuchitaka ku Malawi kuno?

   ……

2. Kodi Mukuganiza kuti pangakhale phindu lanji ku dziko la Malawi ngati mpamba ndi Airtel Money zitalumikizana kapena ngati anthu angmathe kutapa ndi kutumiza ndalama ku account yao ku bank kudzera pa TNM Mpamba kapena airtel Money?

   ……

3. Mukuganiza kuti inu ngati Agent, mungapindule bwanji ndi zimenezi zitachitika?

   ……

4. Kodi nanga mavuto amane angapezeke ku dziko la Malawi zimenezi zitachitika ndi otani?

   ……

5. Mavuto amane inu ngati wa business mungakumane nao ndi otani?

Zikomo kwambiri potenga nao mbali pa kafukufukuyu.

Appendix G: Sample TNM Mpamba Transaction Record Sheet

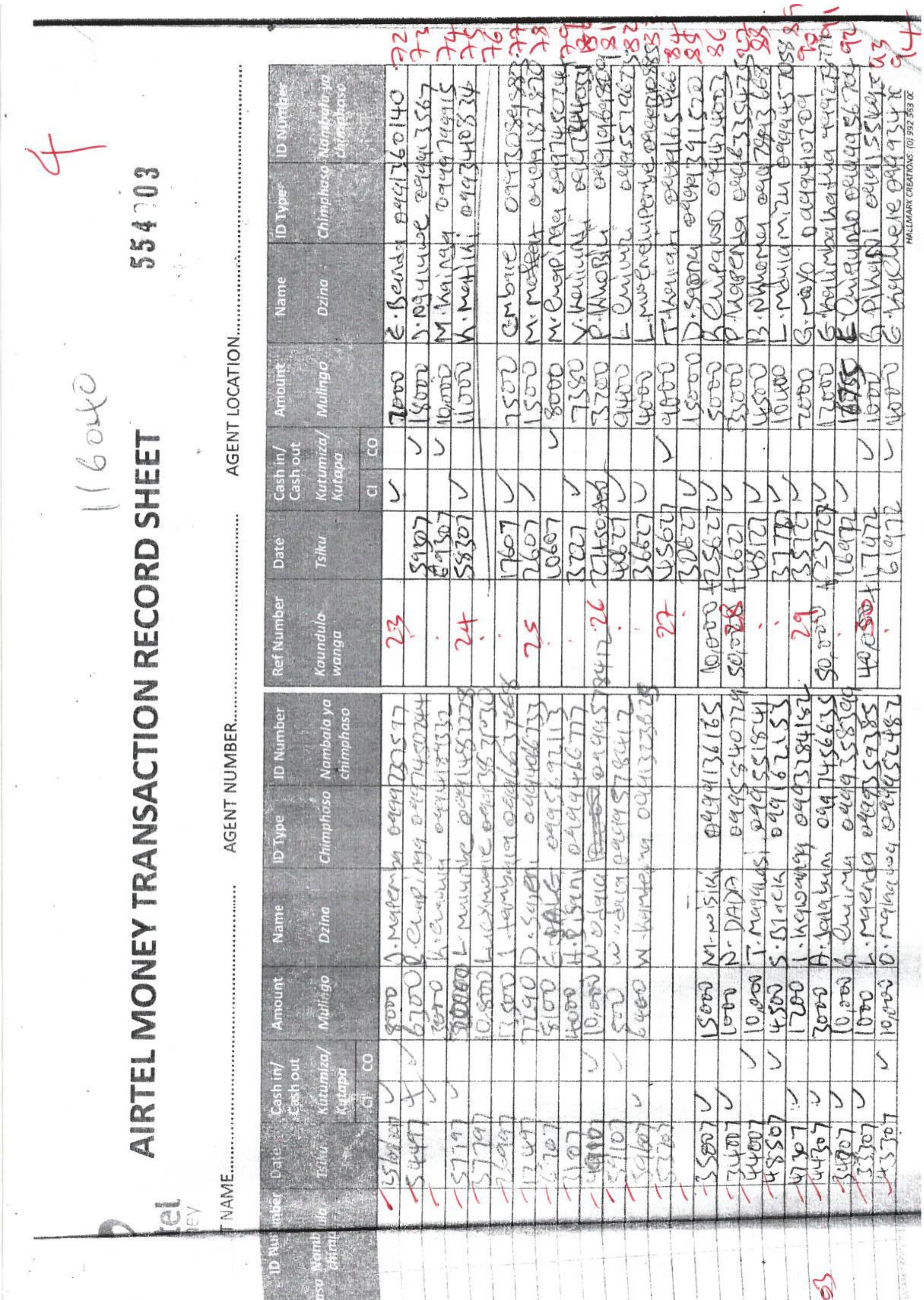
MPAMBA TRANSACTION RECORD SHEET

AGENT NAME: H C.I.   AGENT NUMBER: 842   AGENT LOCATION: TNM

Date /Tsiku	Agent Float /Mulingo Wa Mpamba	Commission Received	Transactions Ref. Number /Nambala ya Ntchitoyi	Transaction Type (Debits) /Kuchotsa	Transaction Type (Credits) / Kuwonjezera	Amount /Mulingo	Phone Number /Nambala ya lamya	Name /Dzina	Signature /Sayini
05/10/17	283570		517961691	Cash-in		7000	883374833		
	279470		517970815	Cash-in		4100	888421666		
	281870				Cash-out	2400	8840860349		
	270670		517974436	Cash-in		11200	884153910		
	260670		517982620	Cash-in		10000	884187427		
	263670				Cash-out	3000	884993175		
	267370				Cash-out	3700	886982802		
	269370				Cash-out	2000	884729098		
	271270				Cash-out	1900	886325755		
	251270		518047738	Cash-in		20000	8000950217		
	262670				Cash-out	11400	881457039		
	26070				Cash-out	1400	888649401		
	252070		518059176	Cash-in		12000	886551877		
	272070				Cash-out	20000	881205007		
	266870		518070811	Cash-in		5200	881339715		
	267370				Cash-out	500	888861862		
	259370		518075959	Cash-in		8000	888201713		
	269870				Cash-out	10000	884455841		
	258970		518078602	Cash-in		10400	888609871		
	263570				Cash-out	9600	881089367		
	269570				Cash-out	1000	888883730		
	275570				Cash-out	6000	884804837		
	263570		518150865	Cash-in		12000	881278308		
	262970		518155672	Cash-in		600	881105735		

573 900

Appendix H: Sample Airtel Money Transaction Record Sheet


AIRTEL MONEY TRANSACTION RECORD SHEET

NAME.............. AGENT NUMBER.............. AGENT LOCATION..............

Ref Number / Koundula wanga	Date / Tsiku	Cash in/Cash out / Kutumiza/Kutapa (CI, CO)	Amount / Mulingo	Name / Dzina	ID Type / Chimphaso	ID Number / Nambala ya chimphaso

HALLMARK CREATIONS