AALBORG UNIVERSITY
COPENHAGEN

Semester: 4th

Aalborg University Copenhagen
A.C. Meyers Vænge 15
2450 København SV

Semester Coordinator: Henning Olesen

Secretary: Maiken Keller

Title: Payment Digitisation in Ghana via Mobile Money

Project Period: Spring 2017

Semester Theme: Master Thesis

Supervisor: Anders Henten

Project group no.: 4.23

Member: Alex Gameli Heyman

Pages: 83

Finished: 08/06/2017

Abstract:

Mobile payment services have become very vital for developing markets due to the slower diffusion of formal financial services. Mobile Money has become one of most successful of these mobile payment services worldwide mostly in developing markets like Africa. This paper seeks to exploit the explosive growth in mobile phone penetration as a medium to digitise payments in Ghana. An amended UTAUT was used to determine the factors affecting mobile money payment adoption in Ghana. The results showed that effort expectancy (EE) was the most significant determinant to users' behavioural intentions to use. In order to promote digital payments using mobile money, the MNOs' have to adopt the MSP supply-push strategy to bring merchants on board to meet their numerous users and take advantage of the cross-side network effect.

Table of Contents

Table of Contents i

Table of Figures iv

List of Tables iv

Chapter One 1

Introduction 1

Background and Motivation 3

Problem statement 5

Research questions 6

Chapter Two 7

Methodology 7

Introduction 7

Research Design 7

Sources of data 7

Population 8

Sample size and sampling technique 8

Data collection instruments 9

Data analysis technique 10

Reliability and Validity 10

Chapter Three 11

Literature Review 11

Introduction 11

Mobile Payments 11

Mobile payments services from around the world 12

Mobile Money 12

Mobile payment technologies 14

Characteristics of Mobile payments 15

Benefits of payment digitisation 16

Theoretical Background 18

Network effects 18
Multi-sided Platforms 19
Technology Acceptance Model 21
Diffusion of Innovation (DOI) Theory 23
Unified Theory of Acceptance and Use of Technology 23
Literature review of mobile money studies using technology acceptance models and theories 27
Proposed Model for the study 29

Chapter four 30

Data Presentation and Analysis 30

Introduction 30
Overview of questionnaires 30
Response rate 31
Results from Survey-1 31
Demographics of respondents 31
Network Subscription and mobile money usage 33
Physical cash vs Mobile money wallet vs Bank accounts 37
Analysis of part four of the questionnaire 40
Summary of results from part four of Survey-1 42
Analysis of the results using the proposed model 43
Results from Survey-2 46
General information on agents' mobile money transactions 46
Challenges faced by mobile money agents 54

Chapter Five 55

Discussion and Conclusion 55

Introduction 55
Discussion 55
Conclusion 63
Limitations 64
Recommendations and Future work 65

References 66

Appendix 1 71

Appendix 2 ..... **76**
Appendix 3a **79**
Appendix 3b **81**
Appendix 3c **83**

Table of Figures

Figure 1: Mobile voice market share in Ghana as of February 2017. Source: NCA, 2017 3
Figure 2: Characteristics of a Multi-Sided Platform. Source: (Hagiu, 2014)....20
Figure 3: Technology Acceptance Model (Davis et al., 1989) 22
Figure 4:Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) 25
Figure 5:Modified UTAUT. Adapted from Venkatesh et al., (2003)....29
Figure 6: Sex of Respondents....32
Figure 7: Network Subscription of Respondents 34
Figure 8: Mobile money account ownership....34
Figure 9:Mobile money network subscription of Respondents 35
Figure 10: Mobile money services usage....36
Figure 11: Monthly frequency of mobile money services patronage 37
Figure 12: Usage of Online payment methods 39
Figure 13: General payment methods....40
Figure 14: Modified UTAUT proposed 43
Figure 15: Number of years of been an active mobile money agent 46
Figure 16: Mobile money services offered by agents in Ghana 47
Figure 17: Agent's purchase of electronic cash....48
Figure 18: Amount of electronic cash purchased by agents 49
Figure 19: Level of difficulty of registration process....50

List of Tables

Table 1: Mobile Money Subscription Data. Source: (Bank of Ghana, 2016)....4
Table 2: Digital Payment framework. Source:(Kazan & Damsgaard, 2013)....21
Table 3: Age groups of respondents....32
Table 4: Level of education of respondents....33
Table 5: Preferences for Cash vs Mobile money vs Bank accounts....38
Table 6: Measuring scales for the modified UTAUT constructs 40
Table 7: Basic statistical summary of responses 42
Table 8: Agents' assessment of frequency of patronage of mobile money services....51
Table 9: Agents' assessment of use of mobile money....52

TABLE 10: DIGITAL PAYMENT FRAMEWORK ANALYSIS OF MTN MOBILE MONEY AS A MSP.....60

Chapter One

Introduction

The proliferation of mobile phones in recent years has led to the emergence of innovative value added services aside the traditional telephony services that came with the mobile phone in its early days. As of May 2017, there were 8,1 billion mobile connections, representing an estimated 4.98 billion unique mobile subscribers worldwide. (GSMA Intelligence, 2017). This explosive growth in mobile phones is in stark contrast to the slower diffusion of formal financial services, such as savings accounts, which have been in existence over the past 500 years. This boom in mobile phones usage has paved the way for many transformational mobile payments services. Mobile Money has become one of most successful of these mobile payment services worldwide and most in developing markets like Africa. This came about because mobile phones have become an integral part of everyday life such that people cannot almost live without them these days. This great attachment to mobile phones has seen the success of mobile money reached greater heights. For example, the rapid early success of M-PESA in Kenya led some experts to predict that low-cost, digital financial services would quickly spread throughout the developed and developing world. (GSMA, 2016b) This is no surprise as statistics from GSMA (2017), indicated that in Sub-Saharan Africa, there were 277 million registered mobile money accounts by the end of December 2016, which is more than the total number of bank accounts in the region.

Today, mobile money is available in 92 countries around the world (ibid), where it has enabled financial inclusion, giving people access to transparent digital transactions and the tools to better manage their financial lives. It has also laid the foundation for a raft of innovation, evolving from a tool for purchasing airtime and sending money between

friends and family to a convenient way to pay for goods and services. Although the use of mobile money for payment of goods and services is well advance in the pioneer country Kenya, is it still yet to develop to its full potential in other countries including Ghana.

This paper seeks to identify factors affecting the adoption of mobile money for payments in Ghana, exploit avenues to promote the payment aspect of mobile money and how to integrate mobile money payment solutions into businesses. The rest of this chapter gives details about background and motivation, problem statement and outline of the research questions the researcher aims to answer at the end of the paper.

Chapter 2 introduces the Methodology, the research methods, tools and techniques used in executing this study. It also discussed where, and how primary and secondary data were gathered and used in this report.

In chapter 3, existing literature related to mobile payments and mobile money were reviewed. Furthermore, theories and models of technology acceptance were reviewed and a proposed model for this study was presented.

Empirical data collected from the field was presented and analysed in chapter 4. This also includes discussions of the results and finally chapter 5 concludes the research where recommendations and limitations of the research were presented.

Background and Motivation

Today, the mobile phone which used to be a luxury that only a few could afford has been transformed into an affordable essential of our daily lives. According to NCA (2017), mobile voice subscription in Ghana was 39,2 million as of February 2017 which represents a total penetration rate of 139,09%. **Figure 1** gives a breakdown of the market shares of the 39,2 million voice subscriptions by the 6 major Mobile Network Operators (MNOs) in Ghana.

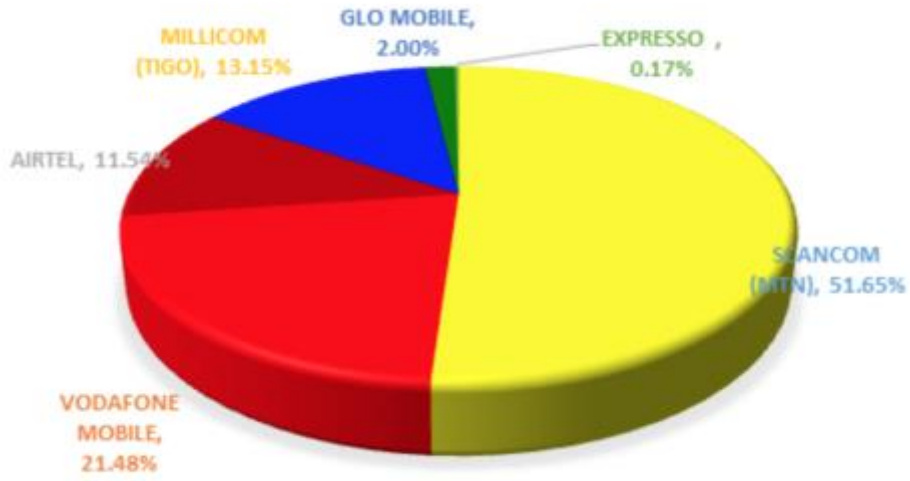

Figure 1: Mobile voice market share in Ghana as of February 2017. Source: NCA, 2017

MTN, the Ghana's largest MNO has the highest share of the voice subscriptions at 51,65% with Vodafone coming in second place at 21,48%, Expresso, the smallest operator in Ghana came in last on the chart with 0,17% of the market share. In a country with a total population of 27,7 million (GSMA Intelligence), the large mobile voice subscription figures imply that averagely, every adult in Ghana owns one or more mobile phones. This ease of access to mobile phones and to mobile services is the outcome of the interplay between regulatory interventions, intense competition among operators and substantial investments by industry players.

Given the high mobile phone penetration in Ghana, mobile money should become a tool that can be exploited in the area of digital payments and financial inclusion. The

mobile money industry continues to grow and is now expanding across more regions. With 271 services in 93 countries at the end of 2015, mobile money is now available in most developing and emerging markets (GSMA, 2016a). The question is no longer whether mobile money services are available, but how to ensure that the industry continues to grow sustainably (Pénicaud and Katakam, 2013). According to GSMA, (2017a), the challenges that most mobile money providers face in West Africa are agent activity due to lack of investment or complex market contexts and the difficulty in changing consumers behaviour and enabling them to make more sophisticated payments using mobile money.

In Ghana, mobile money has developed rapidly since its launch in 2009 by the largest mobile network operator MTN. The service is now offered by four different MNO's in the country, serving over 19,7 million registered customers out of which 8,3 million are active users and 107.441active agents. The table **below** shows growth indicators of mobile money operations in Ghana from 2012 to 2016.

Table 1: Mobile Money Subscription Data. Source: (Bank of Ghana, 2016)

Indicators	2012	2013	2014	2015	2016	2016 % Growth
Total number of mobile voice subscription (Cumulative)[3]	25,618,427	28,026,482	30,360,771	35,008,387	37,369,666*	6.74
Registered mobile money customers (Cumulative)	3,778,374	4,393,721	7,167,542	13,120,367	19,735,098	50.42
Active mobile money customers[4]	345,434	991,780	2,526,588	4,868,569	8,313,283	70.75
Registered Agents (Cumulative)	8,660	17,492	26,889	79,747	136,769	71.5
Active Agents[5]	5,900	10,404	20,722	56,270	107,415	90.89
Total volume of transactions	18,042,241	40,853,559	113,179,738	266,246,537	550,218,427	106.66
Total value of transactions (GH¢'million)	594.12	2,652.47	12,123.89	35,444.38	78,508.90	121.5

The figures from the table show massive growth in mobile money in the year 2016, although there has been only 6,74% growth in number of voice subscribers, there was a rapid growth in the number of registered mobile money subscribers (50,42%) and active mobile money customers (70,75%). Agent subscription also increased by 71,5% whereas active agents got a big boost by 90,89%. The volumes and values of

transactions have also seen huge increments by 106,66% and 121,5% respectively. Despite an overall growth in subscriptions and transactions, most of these transactions are fund transfer, remittances and airtime purchase based while ecosystem transactions like merchant payments, bill payments and bulk payments are yet to flourish.

Problem statement

According to World Bank, (2014) only 41% of adults in Ghana own an account for transaction of any sort (bank accounts, mobile money accounts and other non-financial institution accounts). Usage of card based products and services offered by banks is not very widespread (only 10% of Ghanaians own a credit/debit card as of 2014). This low level of financial instruments makes the use of cash to be the predominant mode of payments in Ghana. From a layman's perspective, the use of cash makes perfect sense since it is simple and to a certain degree fast. Based on this, alternative modes of payment such as card payments and mobile money payment services have to be free for users since switching back to cash is easy. Businesses especially ecommerce in Ghana are struggling to draw customers onto their platforms because of limited payment options available to users when they want to make transactions online.

Fortunately, the increased adoption rate of mobile money provides an avenue to be exploited to offer supplementary means of payment to the unbanked and non-card holders in the country. Although mobile money has advanced rapidly in Ghana since its launch in 2009, it has mainly been remittance/fund transfer and airtime purchase focused and using the service for payments is yet to catch up. The level of trust users currently associate with the service is very high based on the growth figures shown in **Figure 1** in the previous section. This provides an indication that mobile money will continue to deepen financial inclusion in Ghana. According to CGAP, (2015), Ghana is in some ways the most Digital Financial Services; DFS-ready country in Africa with 92% of adults that have the required ID necessary to open and account, 95% have basic

numeracy and 91% own a mobile phone and 74% already send and receive text messages.

This paper seeks to exploit avenues to promote mobile money payments in the quest of payments digitisation in Ghana. This in effect should help businesses especially e-commerce gain competitive advantages by offering mobile payments to their customers and thereby enhancing the business of e-commerce platforms which are struggling to deal with the unbanked population which are not being able to do business with them due to limited online payment options.

Research questions

1. What is the current status of mobile money with regards to payments in Ghana?
2. What are the factors that affect the adoption of mobile money-payments in Ghana?
3. How can the use of mobile money as a medium of payment be promoted?
4. How can e-commerce platforms make the most out of mobile money as a payment medium to boost their businesses

Chapter Two

Methodology

Introduction

The methods used in completing this research are outlined in this chapter. The chapter highlights the research approach, sources of data collected, the sample size and sampling methods used as well as data gathering instruments and data analysis techniques used to complete this research.

Research Design

This report is aimed at depicting the overall status of Mobile Money as a medium of payment in Ghana, proposing ways to improve the digital payment system in Ghana using Mobile Money and how to incorporate this method of payment into online businesses. In other to achieve these objectives, a blend of the descriptive research design and the review research design was used in this study.

Sources of data

Both primary and secondary data were used in this research. Secondary data was reviewed from academic papers, industry reports (e.g. GSMA reports on Mobile money), journals, company websites and relevant national regulatory bodies' websites (Bank of Ghana: https://www.bog.gov.gh/ and National Communication Authority http://www.nca.org.gh). Primary data was collected through two different sets of surveys, the first survey (see Appendix 1) was targeted towards mobile phone users which was administered both online and manually as some section of the targeted

population could not be reached online.

The second survey (see Appendix 2) was targeted towards Mobile Money agents in Ghana and this was administered manually. Furthermore, three interviews were conducted with the other key stakeholders in the Mobile Money ecosystem, namely; Ecobank Ghana, (Mobile money partner bank), MTN Ghana (Mobile money provider), and Vodafone Ghana (Mobile money provider), to validate the findings. See Appendix 3a, 3b and 3c for transcribed interviews.

Population

The total mobile voice subscribers in Ghana is the population of interest for this research with more focus on mobile money customers and agents and other key stakeholders in the mobile money ecosystem such as the MNOs the banks and ecommerce platform operators. According to NCA (2016), there were 37.369.666 mobile voice subscribers as of October, 2016, out of which there were 19.735.089 registered mobile money customers with only 8.313.283 of them being active customers. Also, there were 136.769 registered mobile money agents with 107.415 active prior to reporting. Four MNOs currently run mobile money services in Ghana with partnership with 29 Banks according to data from Bank of Ghana's 2015 Annual report, however, the total number of ecommerce platforms in Ghana as at the time of writing could not be ascertained.

Sample size and sampling technique

Considering the time schedule for this research, the entire population mentioned above could possibly not be surveyed looking at the big numbers involved. Therefore, a sample of the population was surveyed and other smaller groups interviewed. 112 and 40 mobile voice subscribers and agents respectively were surveyed. There were two separate sets of survey conducted, namely "Mobile money payment survey for general

phone users" and "Mobile money payment survey for agents" both of which are referred to as survey-1 and survey-2 in this paper for simplicity reasons. The respondents to the users' survey were randomly reached out to by means of social media (online-based, about 50 responses) and in-person (paper-based) all of which were mostly based in Accra. The merchants were all reached out to in person and their geographical location was Accra, Ghana.

The interviewees were carefully selected each from the major stakeholders of the mobile money ecosystem whose population is not that large to conduct a survey and also in the quest to collect some form of qualitative data to supplement the quantitative data collected from the surveys.

Data collection instruments

Primary data for the research was collected through two sets of questionnaires. SurveyMonkey® an online research and survey tool was used in the design and partly in distribution of the questionnaires. Some of the respondents who could not be reached online were handed hard copies of the questionnaires, these responses were later entered into the online survey tool to aggregate the data. Furthermore, 3 interviews were conducted with representatives from the major stakeholders in the Mobile Money ecosystem to gather qualitative data.

The questions asked both in the surveys and the interviews were based on the research questions and also on the constructs of the theoretical frameworks used in the report. The survey questions demanded "Yes" or "No" responses, Likert-type responses, multiple choice responses and open-ended questions in some cases. For the interviews, the semi-structured type of interview was used where the interviewees were provided with interview guides prior to the set time for the interview. All primary data was therefore collected solely from Ghana, predominantly Accra, the capital city.

Data analysis technique

The data collected from the surveys using the SurveyMonkey® were analysed with the same SurveyMonkey® to obtain charts. Data was then exported to Microsoft Excel to make viewing and interpretation easy. Descriptive data analysis was chosen as the appropriate way to analyse the survey questionnaire data. Frequency and percentages were calculated for each variable.

Reliability and Validity

In order to validate the responses collected from the survey, the payment systems in Ghana were reviewed and the drivers and challenges of Mobile Money were outlined based on the 2016 GSMA Mobile Money global report. This approached gave the researcher the insights into the kinds of questions to develop in order to achieve the desired outcomes for this research. More also, the questionnaires were fully examined by the researcher and the supervisor in terms of content in relation to the research objectives. As a test of reliability, the questionnaires for the general phone users were evenly distributed by the two media used to administer them, 50% online and 50% hand-copy administered to ensure the consistency of the responses. The location of most of the respondents of both surveys was mainly Accra except for few respondents who lived outside Accra. Furthermore, the interviews conducted also acted as validity checks for the quantitative data collected from the surveys.

Chapter Three

Literature Review

Introduction

This chapter reviews already existing research about mobile payments, mobile money, and technology acceptance models that have been associated with the intention to use and the actual use of mobile money services. Furthermore, the Multi-sided platforms for digital payments and network effects were also reviewed as they play an important role to the widespread adoption of mobile payments.

Mobile Payments

Mobile payments (m-payments) are payments made under financial regulation for goods, services, and bills with a mobile device (such as a mobile phone, smartphone, or personal digital assistant (PDA)) by taking advantage of wireless and other communication technologies. (own elaboration based on (Shrier, Canale, & Pentland, 2016) and (Dahlberg, Mallat, Ondrus, & Zmijewska, 2008))

According to ITU, (2013) there are two major categories of mobile payments, namely: Remote payments and Proximity payments, but recent studies claim a third category called Online-to-offline (O2O) payment according to Zhou, (2013) and Zhong, (2015). Remote payment requires that a mobile device connects to a remote payment server, via a wireless network, Unstructured Supplementary Service Data (USSD), SIM Application Toolkit (STK) or SMS. Mobile money which is the main focus of this study falls under the remote payments category where technologies such as USSD and STK are used to implement the service. Proximity payment implies users conducting monetary transactions through smartphones on the spot, for instance, through using Quick Response (QR) code or Near Field Communication (NFC) technology. O2O

which can technically be classified under remote payments is an innovative payment solution that allows customers to conduct payments through an online interface and then consume a product or service in an offline scenario. (ibid)

Mobile payments services from around the world

To get a world view of mobile payments, it is of importance to highlight other mobile payments outside of Ghana. The researcher is aware of mobile payment services such as MobilePay (Denmark), Swiss (Sweden), Google Wallet (worldwide), Apple Pay (Worldwide), AliPay (predominantly Asia), WeChat (China), Samsung Pay (worldwide), and PayPal (worldwide). However, for the purpose of this study only M-PESA will be highlighted in the subsequent section since it has become the most successful mobile payment (Mobile money) service in Africa since its launch in Kenya in 2007.

Mobile Money

According to GSMA, (2017) a service is considered a mobile money service if it meets the following criteria:

- ✓ Includes transferring money and making payments using the mobile phone.
- ✓ The service must be available to the unbanked, e.g. people who do not have access to a formal account at a financial institution.
- ✓ The services must offer at least one of the following products:
    - Domestic or international transfer;
    - Mobile payment, including bill payments, bulk disbursement, and merchant payments;
    - Storage of value.
- ✓ The service must offer an interface for initiating transactions for agents and/or customers that is available on mobile devices.

- ✓ The service must offer a network of physical transactional points outside bank branches and ATMs that make the service widely accessible to everyone.
- ✓ Payment services linked to a traditional banking product or credit card, such as Apple Pay and Google Wallet, are not included
- ✓ Mobile banking services that offer the mobile phone as just another channel to access a traditional banking product are not included.

The researcher therefore defines mobile money as an electronic cash that is remotely stored in the accounts of mobile subscribers of a telecommunication company or a bank that enables the subscribers to make transactions without an internet connection.

The most cited mobile money service in most literature is the M-PESA which is operated by Safaricom, a telecommunication company in Kenya and Tanzania. The M-PESA was launched in 2007, and it recorded more than 6 million registered users in its first year. (Mbiti and Weil, 2011).

M-Pesa

M-Pesa, a mobile payment service launched in 2007 in Kenya, was developed through a joint venture between mobile network operators, Vodafone and Safaricom. M-Pesa was launched at a time that there was a low percentage of the population with access to bank accounts connected to payment services. On the other hand, nearly the entire population had access to a mobile phone (Mbiti and Weil, 2011). M-Pesa enabled deposits and withdrawals between users and companies. According to GSMA (2014) there were more than 26.2 million M-PESA accounts in Kenya on Safaricom's network and they employed more than 116,000 agents across the country. The service was later implemented in different variants in other markets such as Tanzania, South Africa, Democratic Republic of Congo, India, Mozambique, Egypt, Lesotho, Uganda, Fiji, Ghana, Albania and Romania. As at December 2016, there were 118 million active (30-day) mobile money accounts worldwide in 93 countries.(GSMA, 2017b)

Mobile payment technologies

There are several mobile payment technologies in existence today and so it is worth mentioning some of such technologies in this section. As mentioned in the previous section, there are two categories of mobile payments and under these categories there are a number of technologies that are deployed. Remote payments usually deploy technologies such as short message service (SMS), Unstructured Supplementary Service Data (USSD), SIM application Tool Kit (STK), Wireless Application Protocol (WAP), or a mobile application. Proximity payments, on the other hand, make use of technologies such as bar codes, a contactless interface and chip-enabled payment technology, such as NFC technology. (ITU, 2013).

For the purpose of this study only remote payment technologies that are implemented in mobile money will be briefly discussed.

Unstructured Supplementary Service Data (USSD)

Unstructured Supplementary Service Data (USSD) is a technology unique to GSM. It is a capability built into the GSM standard to support the transmission of information over the signalling channels of the GSM network. USSD provides a two-way session-based communication enabling a variety of transactions on the mobile phone. (Carr, 2007) With USSD the user has to dial a short number in order to activate the menu. After each input the data has to be sent to the server and the new menu screen sent back, which can be time consuming. (GSMA, 2012)

SIM Toolkit (STK)

SIM Tool Kit (STK) is a technology that allows a SIM inserted in a mobile phone execute some network specific applications implemented on the SIM card. The STK enables value added services to be execute on the mobile handset. Examples of such services are mobile money, online banking and information services. (Multi-tech,

2007) With STK, the user has an application on the SIM card which is accessed from the phone's menu. This offers very high levels of security and does require the SIM card to be swapped when a user registers for mobile money. Compared to USSD, STK provides a better user experience. (GSMA, 2012)

Characteristics of Mobile payments

For a mobile payment service to become acceptable in the market, it must possess the following characteristics; Simplicity and usability, universality, interoperability, trust, privacy, security, cost, speed, cross border payments, local market understanding, and finally integration of legacy approaches. (Karnouskos, 2004); (Carr, 2007).

Simplicity and Usability: The mobile payment application must be user friendly with little or no learning curve to the customer.

Universality: M-payments service must provide for transactions between one customer to another customer (C2C), or from a business to a customer (B2C) or between businesses (B2B). The coverage should include domestic, regional and global environments. Payments must be possible in terms of both low value micro-payments and high value macro-payments.

Interoperability: Development should be based on standards and open technologies that allow one implemented system to interact with other systems.

Security, Privacy and Trust: A customer must be able to trust a mobile payment service provider that his or her credit or debit card information may not be misused. Secondly, when these transactions become recorded customer privacy should not be lost in the sense that the credit histories and spending patterns of the customer should not be openly available for public scrutiny. Mobile payments have to be as anonymous as cash transactions. Finally, the system should be fool-proof, resistant to attacks from hackers. This may be provided using public key infrastructure security, biometrics and passwords integrated into the mobile payment solution architecture.

Cost: The m-payments should not be costlier than existing payment mechanisms to the extent possible. A m-payment solution should compete with other modes of payment in terms of cost and convenience.

Speed: The speed at which m-payments are executed must be acceptable to customers and merchants.

Cross border payments: To become widely accepted the m-payment application must be available globally.

Local market understanding: Customers that are comfortable with prior payment methods need incentives in order to start using new approaches. The usage of a mobile device is not enough, hence, customers and merchants' needs to find other benefits for the local markets. Every country has different social conditions and so successful scenarios in one country may not be suitable for another country.

Integration of legacy approaches: Mobile payments should be able to reuse existing infrastructure and legacy billing systems. For instance, bank systems that is difficult to change. (Karnouskos, 2004); (Carr, 2007).

Benefits of payment digitisation

A survey conducted by Gallup Inc. of 11 sub-Saharan African countries revealed that more than 80 percent of adults make bill payments or remittances with cash (Kendall et al., 2014). With the low levels of digital-payment penetration, governments, consumers, and financial providers in sub-Saharan Africa are still bearing the high cost of cash payments, for example, costs associated with manual acceptance, record keeping, counting, storage, security, and transportation. There is a huge revenue pool to be tapped if there is good investment and usage of digital payments in sub-Saharan Africa. (ibid)

On the other side, advancements in technology and electronic-platform-based business models have allowed many governments to increase the efficiency and scope of their electronic payments infrastructure. (World Bank, 2014)

Digital payments have many benefits, for both payers and payees. Moving from cash-based to digital payments has the potential benefits of making payments more efficient by:

1. **Lowering the cost of disbursing and receiving payments**; for instance, a study on the lessons from the Mexican government's shift to digital payments (which began in 1997) showed that the shift has trimmed its spending on wages, pensions, and social welfare by 3.3 percent annually, equivalent to about $1.3 billion (Babatz, 2013).
2. **Decreased cash management**; Businesses that adopt mobile payments will not just lower transaction cost, but also decrease cash management, which in turn will improve the speed in different processes and enhance customer service (Mallat & Tuunainen, 2008).
3. **Increasing individuals' risk management capacity**; Researchers found that, in Kenya, following a shock, households with access to M-PESA received funds from a larger network of senders, and from senders located further away. Digital payments thus appear to both facilitate the receipt of payments as well as strengthen and expand informal insurance networks among poor households (Jack and Suri, 2013).
4. **Increasing the security of payments:** this reduces the incidence of crimes associated with handling physical cash.
5. **Providing a first entry point into the formal financial system (Financial Inclusion):** to the unbanked for savings or payments. Empirical evidence at the micro and macro levels shows that inclusive financial systems are an important component to economic and social progress on the development agenda (Cull et al., 2014)

In short, the benefits of digital payments go well beyond convenience; if provided efficiently and effectively, they can transform the financial lives of those who use this technology. (World Bank, 2014)

Theoretical Background

To fully understand the factors that will lead to the adoption and use of mobile money as a method of payment in Ghana, there is the need to dive into the information systems. Timely and accurate information is a key to gaining performance efficiency without which a company can invest in a new technology only to realise that users are not willing to accept and use the new technology.

In view of this, it is imperative to review some of the most widely used theories of technology acceptance as well as network effects and multi-sided markets for the purpose of this research. Previous researchers of the adoption and use of mobile money have used the Technology Acceptance Model (TAM), Davis (1989) or Rogers' (1995) Diffusion of Innovation (DOI) theory; (Kalba, 2016) or a combination of both TAM and DOI; (Tobbin & Kuwornu, 2011); or the Unified Theory of Acceptance and Use of Technology (UTAUT) Venkatesh et al. (2003); (Mugambe, 2017); (de, Abrahão, Moriguchi, & Andrade, 2016); (Omol, Ogalo, Abeka, & Omieno, 2016). This section will review the above mentioned theories and then come up with the best fit to be used for this paper.

Network effects

The network effect theory developed by Katz and Shapiro (1985) is deemed important to consider for this paper as the success of adoption of mobile payment services depends on network size of individuals using the service. Network effect theory posits that the benefits that adopters derive from a network technology are positively

associated with the size of the network (Katz and Shapiro 1986). There are two types of network effects, namely direct network effects and indirect network effects or cross-side network effects. Direct network effects occur when an increase in usage leads to a direct increase in value for other users. With indirect network effects the value to customers on one side of a platform typically increases with the number of participating customers on another side.(Hagiu, 2014)

Users learn by observing others where families, friends, and colleagues has the ability to influence adopters' decisions regarding new payment approaches. (Musa et al., 2015) The utility derived from the use of a particular electronic payment instrument depends on the number of users using the same instrument (Kauffman and Wang, 2002). The more users that use the same instrument, the more merchants will accept that instrument and vice versa. This increases the utility of each user since the payment instrument becomes more practical (Au and Kauffman, 2001). An indirect network effect can also lead users to value a system that is more popular and easy to identify when many merchants offer similar services (Katz & Shapiro, 1994). Shapiro and Varian (1999) suggested that standards enhance interoperability. This will increase network externalities by creating greater value for the users by making the network larger, when cross-network transactions are made possible.

Multi-sided Platforms

Models of Multi-sided platforms were pioneered by Armstrong (2006), Caillaud and Jullien (2003), Parker and Van Alstyne (2005), and Rochet and Tirole (2003).

Hagiu, (2014) defined multi-sided platforms (MSPs) as technologies, products or services that create value primarily by enabling direct interactions between two or more customer or participant groups. There are two key characteristics of a multi-sided platform, these are:

1. They enable direct interactions between two or more distinct sides
2. Each side is affiliated with the platform

These two key characteristics are depicted in Figure 2 below.

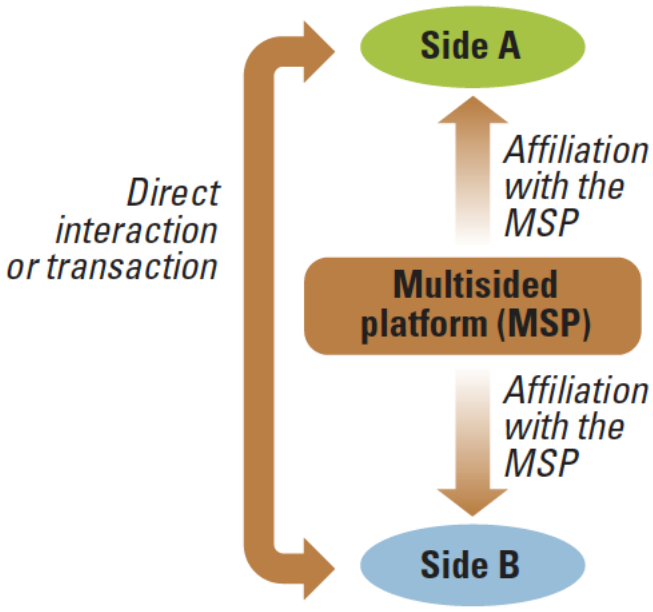

Figure 2: Characteristics of a Multi-Sided Platform. Source: (Hagiu, 2014)

Over the years, some MSPs have grown into very giant forces in the market. Prominent among them are: Facebook (users, advertisers, third-party game or content developers and affiliated third-party sites); Apple's iOS (application developers and users); Google's Android operating system (handset manufacturers, application developers and users); PayPal, American Express, and Square (merchants and consumers) to mention a few. As MSPs serve multiple sides of the market, they potentially have multiple revenues and profit sources. In reality, however, this is not always the case as a study conducted by Hagiu, (2014) revealed that most MSPs have discovered that they have to offer their services for free or at subsidized prices to at least one side of the platform and derive their profits on the other side.

Kazan and Damsgaard, (2013) developed a framework for analysing digital payments as a multi-sided platform. The framework analyses the strategies that payment service

providers need to adopt in the multi-sided market in order to gain leadership in the market. **below** is a table illustrating the digital payment framework.

Table 2: Digital Payment framework. Source:(Kazan & Damsgaard, 2013)

Criteria: MSP	Description
Direct Interaction	Classifies a platform as being a Multi-Sided Platform.
Network Effects	Illustrates the attractiveness of a platform that can draw users, based on cross-side effects or same-side effects.
Homing Costs	Costs of adoption, which serves as an indicator for platform affiliation.
Switching Costs	Points to lock-in effects.
Bundling & Envelopment	Threat of *envelopment* through prospective competitors who enter the payment market and have shared customer relationships. Platform owners can counteract envelopment through *bundling* to increase their value proposition.
Platform Design	Describes open and closed systems and how complementary products are distributed.
Technological Solution	The applied technology that determines customer ownership, accompanied through an evolutionary or revolutionary hardware strategy.

This framework consists of seven criteria that must be met by a digital payment service provider to fully get a foothold over the market. This framework will be adopted in this study to analyse the MNO's providing mobile money services in Ghana as this research seeks to promote digital payments in Ghana.

Technology Acceptance Model

Davis (1989) developed the Technology Acceptance Model (TAM) based on the Theory of Reasoned Action (Ajzen & Fishbein, 1980). The TAM uses two variables, perceived usefulness (PU) and perceived ease of use (PEOU), as determinants of user acceptance. A key element of the TAM is behavioural intention (BI) which leads to the desired action and use of a system. Perceived Usefulness (PU) is said to be the degree to which a person thinks that using a particular system will enhance his performance. Whereas Perceived Ease of Use (PEOU) is the degree to which a person believes that using a particular system will be free of effort (Davis, 1989). **below** is a diagram of the model

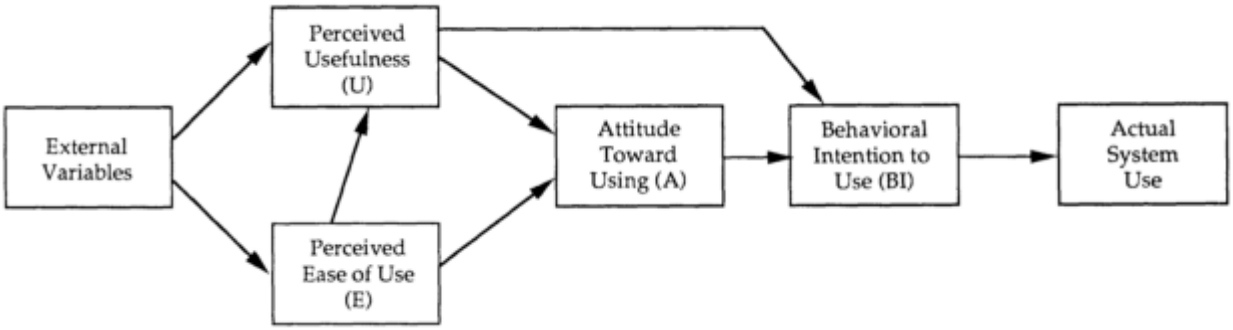

Figure 3: Technology Acceptance Model (Davis et al., 1989)

Davis hypothesized that the actual use of technology is determined by behavioural intention (BI). The perceived usefulness (U) is based on the observation that "people tend to use or not use the application to the extent they believe it will help them perform their jobs better" (Davis, 1989, p. 320). As shown in **Figure 3**, Perceived usefulness (U) directly influences the attitude toward the use of a technology and directly influences the behavioural intention to use (BI). Even if an application is perceived as useful, it will only be used if it is perceived as easy to use, hence Perceived ease of use (E) directly influences the perceived usefulness (U). E influences Attitude (A) toward use of the technology. These two determinants, U and E directly influence a user's attitude toward using the new technology, which in turn leads to the user's behavioural intention to use (BI). The final effect is behavioural intention to use (BI) leading to actual system use. The external variables in the model refer to a set of variables such as objective system design characteristics, training, computer self-efficacy, user involvement in design, and the nature of the implementation process (Davis & Venkatesh, 1996).

Diffusion of Innovation (DOI) Theory

The Diffusion of Innovation Theory by Rogers (1995) is mostly used to explain how innovations diffuse through a social system and how organizations and individuals accept new innovations. According to Rogers the diffusion process occurs within societies (group process) whilst the adoption process is related to an individual. Innovation according to Rogers is defined as *"an idea, practice or object that is perceived as new by an individual or another unit of adoption", while diffusion is "the process by which an innovation is communicated through certain channels over time among the members of a social system"* (Rogers, 1995, p.10). He went ahead to group members in a social system as innovators, early adopters, the early majority, the late majority and the laggards. Rogers also outlined five stages of the process of innovation diffusion as: knowledge, persuasion, decision, implementation and confirmation (Rogers, 2003).

One shortcoming of the theory has been highlighted by Clarke (1999, p.17) who states that classical Diffusion of Innovation theory, in the context of the IS discipline, is "at its best a descriptive tool, less strong in its explanatory power, and less useful still in predicting outcomes and providing guidance as to how to accelerate the rate of adoption".

Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) has been developed from eight earlier user acceptance models; Theory of Reason Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), Motivational Model (MM), Combine Technology Acceptance Model and Theory of Planned Behaviour (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT). The UTAUT

aims to explain user intentions to use a technology or an information system and further the usage behaviour. Venkatesh et al. (2003) developed this synthesized model to present a more complete picture of the user acceptance process than any of the earlier individual acceptance models. Each model attempts to predict and explain user behaviour using a variety of independent variables. The empirical and conceptual similarities across these eight models were exploited to create the UTAUT. The theory posits that four key constructs; performance expectancy, effort expectancy, social influence, and facilitating conditions are direct determinants of usage intention and behaviour (Venkatesh et al., 2003).

Gender, age, experience, and voluntariness of use are posited to mediate the impact of the four key constructs on usage intention and behaviour. The model attempts to explain how demographics can influence technology use. This means that the relationship between perceived usefulness, ease of use, and intention to use can be moderated by age, gender, and experience. For example, the strength between perceived usefulness and intention to use varies with age and gender such that it is more significant for male and younger age groups. The effect of perceived ease of use on intention is also moderated by gender and age, such that it is more significant for female and age groups, and those effects decrease with experience (Venkatesh et al., 2003). This theory according to Venkatesh et a. (2003) has accounted for 70% of varieties in behavioural intentions and 50% in actual use of technology.

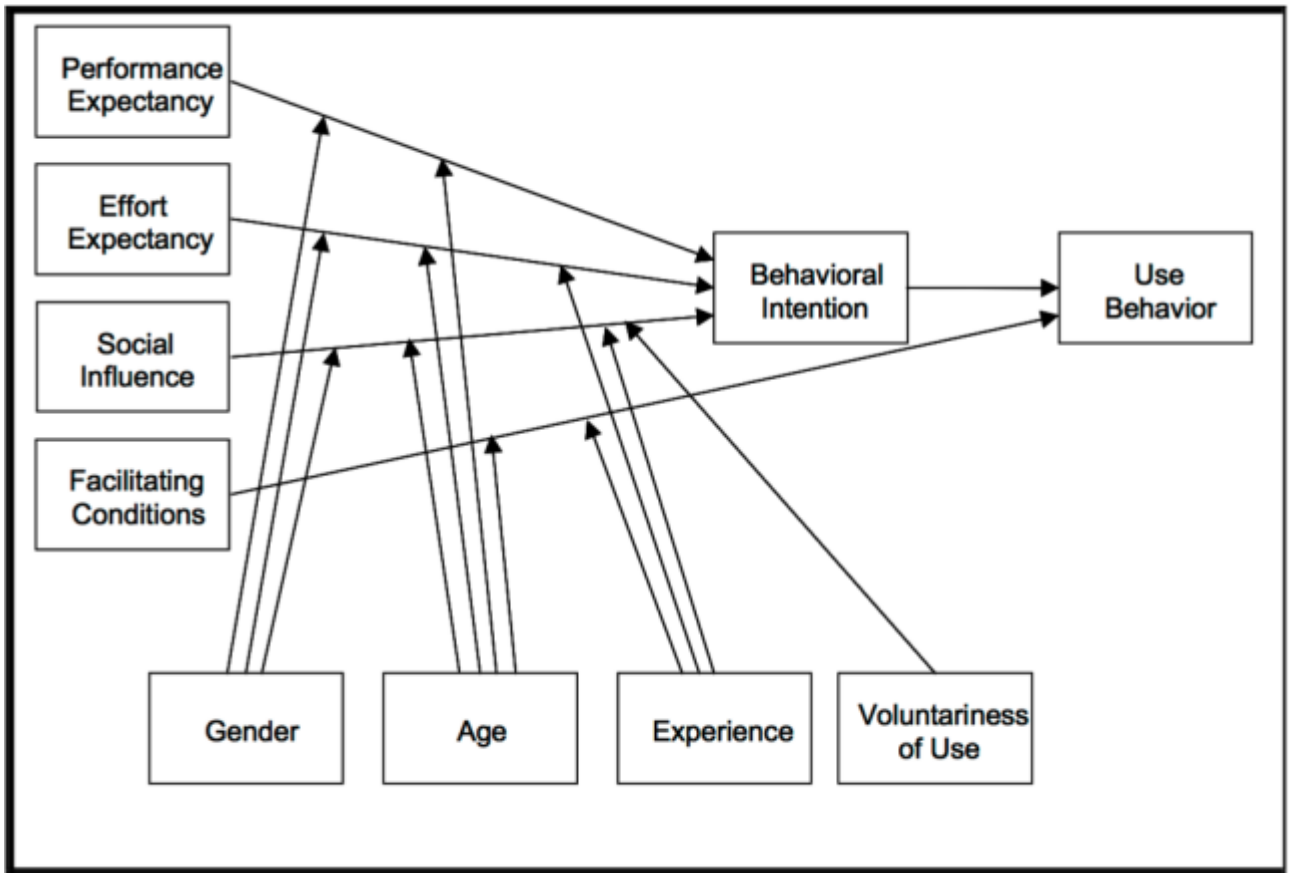

Figure 4:Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

The theory depicted in Figure 4 has four main constructs;

1. Performance expectancy (PE): "is the degree to which an individual believes that using the system will help him or her to attain gains in job performance."
2. Effort expectancy (EE): "is the degree of ease associated with use of the system."
3. Social influence (SI): "is the degree to which an individual perceives that it is important others believe he or she should use the new system."
4. Facilitating conditions (FC): "is the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (Venkatesh et al., 2003).

Performance expectancy (PE) is derived from a combination of five similar constructs, including perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations. This construct was validated to be significant in both voluntary

and mandatory use settings (Venkatesh et al., 2003).

Effort expectancy (EE) captures the notions of perceived ease of use and complexity. Ease of use is the second component in the TAM Davis (1989) and is generally believed to have a significant influence on technology acceptance as well as perceptions of usefulness. This construct like the effort expectancy was also validated to be significant in both voluntary and mandatory use settings (Venkatesh et al., 2003).

Social influence includes consideration of an individual's perception of the opinion of others, his or her reference group's subjective culture, and the degree to which use of an innovation is perceived to enhance an individual's image or status in one's social system (Venkatesh et al., 2003). The social influence construct was derived from previous models constructs' such as subjective norm, social factors and image. This construct suggests that an auditor would be sensitive to the opinions of others, resulting in decisions consistent with the social norms around them. In their validation tests, Venkatesh et al. (2003) found that social influence was not significant in voluntary contexts, but becomes important when its use is mandated.

Facilitating conditions (FC) represents organizational support, and includes the constructs of perceived behavioural control, facilitating conditions, and compatibility from previous models. Again this construct, from the UTAUT validation test was deemed significant in both voluntary and mandatory settings in the initial usage period, but its influence on usage intentions disappeared after users have become used to the system. Furthermore, FC appears to be fully moderated by effort expectancy, such that, when both PE and EE are present, FC becomes non-significant in predicting intention (Venkatesh et al., 2003).

According to a model comparison test by (Venkatesh et al. 2003; Kripanont 2007; Wu, Tao and Yang 2007), the UTAUT turned out to be the model with the highest explained

variance of 0.69 with the DOI and TAM lagging behind at 0.4 and 0.52 respectively. The UTAUT is rich in the explanatory ability in explaining behavioural intention and usage of technology. It therefore contributes to a better understanding about the drivers of behaviour of acceptance and the use of new technologies than other similar theories and models (Venkatesh et al. 2003; Kripanont 2007; Wu, Tao and Yang 2007).

After a thorough review of the major theories used in previous literature on mobile money acceptance and use, it is now obvious that the UTAUT is the best theory to use for the purpose of this paper. However minor changes will be made to the model to suit the context and purpose of this study.

Literature review of mobile money studies using technology acceptance models and theories

A number of studies based on various technology acceptance models have investigated the adoption and use of mobile money services in developing countries like Ghana: (Tobbin & Kuwornu, 2011); Kenya: (Omol et al., 2016); Uganda: (Mugambe, 2017); and Brazil: (De et al., 2016).

The first of these studies to be considered in this report is Tobbin and Kuwornu (2011). They surveyed 288 mobile phone subscribers in Ghana to predict their behaviour and intentions to use mobile money transfer services in Ghana. Using a combination of TAM and DOI theory, Tobbin and Kuwornu (2011) came up with an extended TAM where additional constructs like Perceived Trust and Perceived Risk were added. Their findings showed that Perceived Ease of Use and perceived usefulness were the most significant determinants to intention to use mobile money transfer in Ghana. Perceived Trust, Trial-ability and Perceived Risk were also found to significantly affect Intention to use.

In a recent study by Omol et al, (2016) they examined whether factors which can affect intention to accept (like demographic Profile, Perceived Usefulness, Perceived Ease of Use and Perceived Risk) affect mobile money payment technology acceptance level by SMEs in Kisumu City, Kenya. The study used a conceptual model based on the UTAUT where an additional construct: Perceived Risk was added with the argument that Perceived Risk is an important construct with a technology involving money. They found out that two factors (demographic profile and Perceived Usefulness (PU)) were significantly affecting the individual intention to accept Mobile Money Payments. However, the effects of Perceived Ease of Use (PEOU) on the intention to accept Mobile Money Payments were contrary to expectations. Perceived Risk which was not a significant determinant from their findings was however, concluded to hinder major SME owners from accepting Mobile Money Payments.

Mugambe (2017) conducted the most recent study on mobile money adoption by Micro Small and Medium Enterprises' (MSMEs) customers in Uganda using the UTAUT2. In this study, 321 MSMEs' customers were surveyed to determine the extent to which UTAUT2 can be used to explain their adoption of mobile money services. The findings from this study showed that Social Influence had the most significant effect on the mobile money usage by customers of MSMEs in Uganda followed by Habit and Facilitating Conditions.

In another study conducted by de, Abrahão, Moriguchi, & Andrade, (2016) to evaluate customers intention to adopt a future mobile payment service using the UTAUT, 605 mobile customers of a telecommunication company in Brazil were surveyed. Using structural equation modelling, 76% of behavioural intention was explained through Performance Expectation, Effort Expectation, Social Influence and Perceived Risk. Perceived cost was found not statistically significant at the level of 5%.

Proposed Model for the study

For the purpose of this study, the researcher proposed a model based of the UTAUT following a critical review of the individual constructs of the original model and existing literature on the topic. The Social Influence construct and the Voluntariness of Use moderator from the original UTAUT model was eliminated to form the proposed model for this study. According to Venkatesh et al., (2003) in their UTAUT validation test, Social Influence was found to be non-significant in voluntary contexts hence this construct will not be considered relevant for this study since mobile money payments use in Ghana in on voluntary basis.

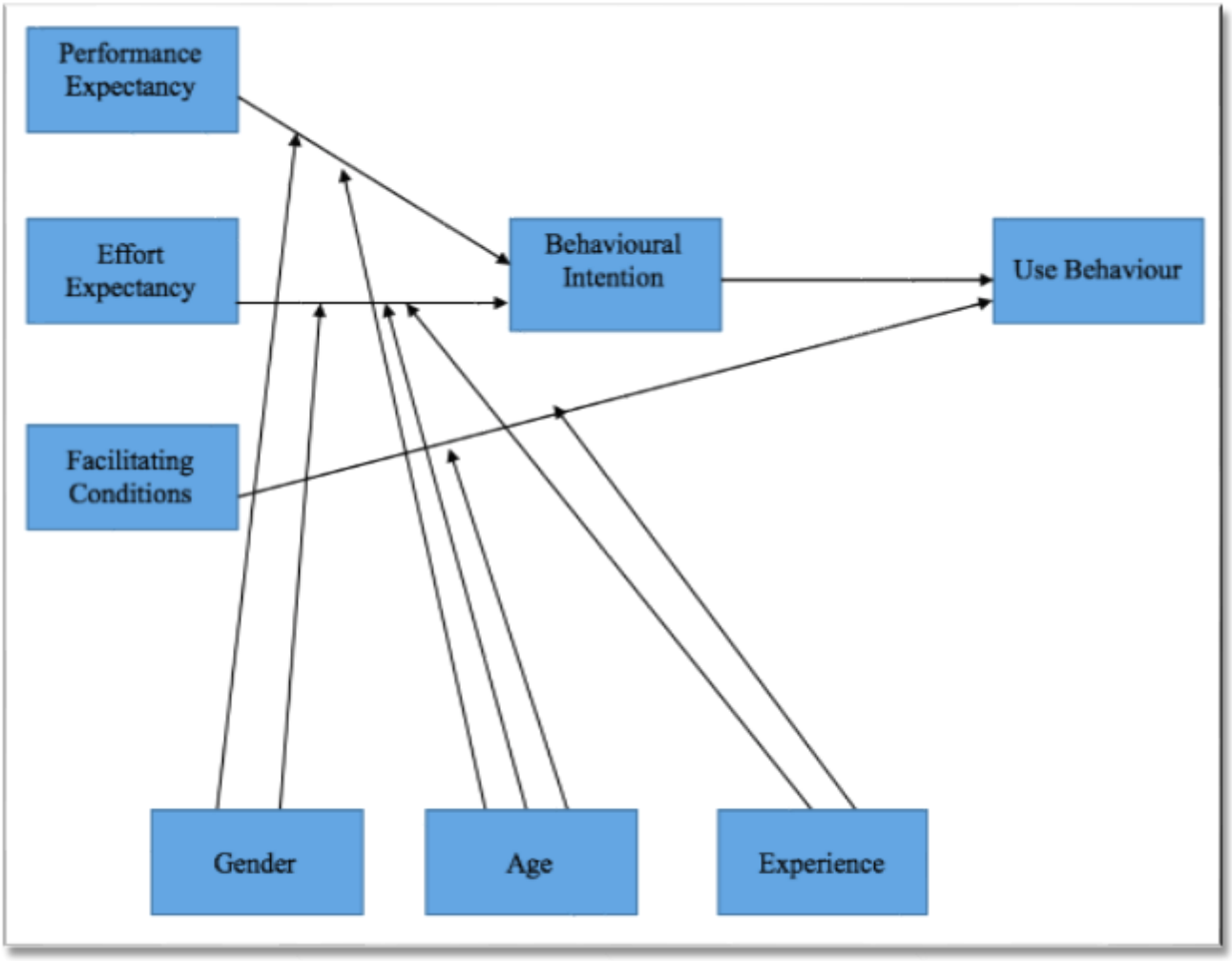

Figure 5:Modified UTAUT. Adapted from Venkatesh et al., (2003)

Chapter four

Data Presentation and Analysis

Introduction

This chapter presents data collected from the field, the analysis and discussions on the finding from both the quantitative and qualitative data collected from the survey questionnaires and interviews respectively. Descriptive data analysis was chosen as the appropriate method to analyse the questionnaire data. Frequency and percentage were calculated for each variable.

Overview of questionnaires

Two surveys were conducted in Ghana and distributed among mobile subscribers and mobile money agents mainly in the capital city, Accra. The questionnaires began with an introduction explaining the purpose of the study and nature of the questions. The survey for the subscribers was named "Mobile money payment survey" while the one for the agents was named "Mobile money payment survey for agents in Ghana". For simplicity sake and for the purpose of this chapter, the survey for the subscribers will be called "**Survey-1**" and the one for the agents will be called "**Survey-2**". As explained in the methodology chapter, survey-1 consists of four parts. Part one collected demographic information about the respondents. Part two of the survey includes multiple choice questions designed to collect information about respondents' network subscription and mobile money usage. Part three contains multiple choice questions to find out respondents' preferences for the use of physical cash, mobile money and bank accounts for their daily transactions.

Finally, part four of the questionnaire includes Likert-type questions based on the UTAUT to measure respondents' attitude towards mobile money payments and find

out challenges they face with mobile money payments. Responses were ordered as follows: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree.

Survey-2 consists mainly of three parts. Part one includes multiple choice questions to find out about general information about mobile money. Part two includes Likert-type questions to find out about agents' perceptions, intentions to continue using the mobile money services and challenges of mobile money. Finally, the last part of the questionnaire requires the respondents to write other challenges they face with mobile money which were not covered in the questionnaire.

Response rate

Survey-1 collected 112 responses from mobile subscribers. Out of the 112 responses, some respondents skipped some questions which do not either apply to them or they just skipped for unknown reasons. On the average, 100 fully completed responses were collected. This makes an approximated response rate of 89%.

Survey-2 on the other hand was distributed to 50 agents with 40 valid responses collected which makes the response rate of 80%.

Results from Survey-1

Demographics of respondents

The research examined the demographic characteristics of the mobile subscribers but not that of the agents since the researcher considered subscribers' demographics as more relevant to the research than that of agents. The demographic characteristics collected include gender, age, and level of education of respondents.

Gender

The results in Figure 6 below shows that 65% of the respondents were male while 35% were female.

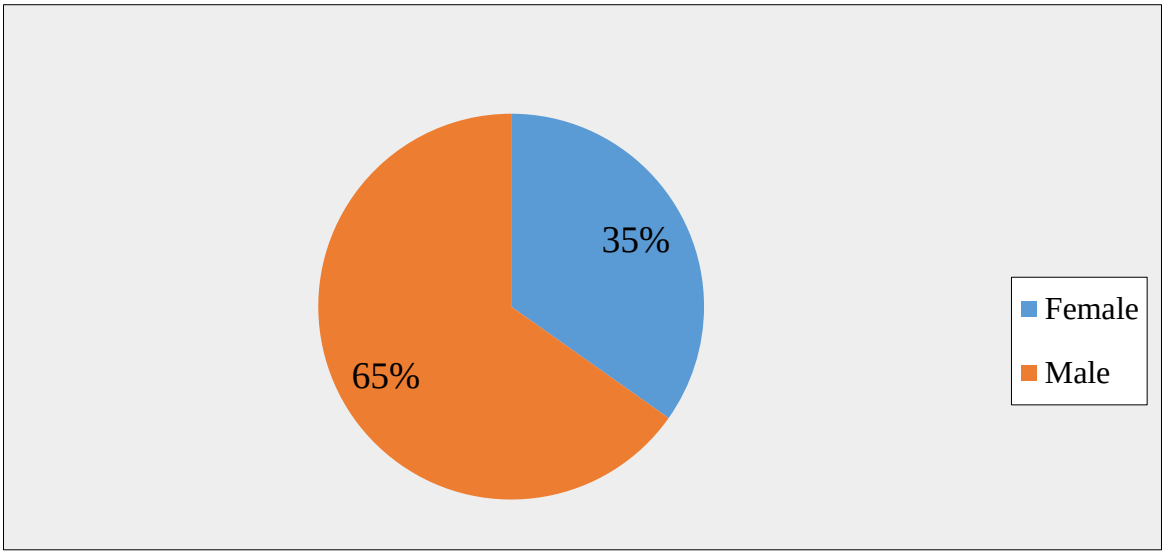

Figure 6: Sex of Respondents

Although the number of male respondents is almost twice that of female, the researcher thinks this is a fair distribution considering the number of female who are willing to participate in things of this sort in Ghana.

Age

The age of the respondents as depicted in Table 3 below shows that 1,8% of the subscribers were below the age of 18 whereas 38,8% were within 18 to 24 years.

Table 3: Age groups of respondents

Age groups	Percentage	Frequency
Below 18	1,8%	2
18 to 24	34,8%	39
25 to 34	58,0%	65
35 to 44	4,5%	5
Above 44	0,9%	1
	answered question	**112**
	skipped question	**0**

It was further found that a little over half (58%) of the respondents were within the ages of 25 to 34 years while 4,5% were between 35 and 44 years with only a mere 0,9% being above 44 years.

Education level

The respondents were required to indicate their highest level of education.

Table 4: Level of education of respondents

Education levels	Percentage	Frequency
Basic	3,6%	4
Elementary School	1,8%	2
High School	26,8%	30
Tertiary	67,9%	76
None	0,0%	0
	answered question	**112**
	skipped question	**0**

As shown in Table 4 above, about two thirds (67,9%) of the respondents have received tertiary education, while about a quarter of them (26,8%) have reached high school. About 1.8% have attained elementary school level with the rest (3,6%) having only basic education.

Network Subscription and mobile money usage

Mobile Network Subscription

Figure 7 below displays the mobile networks used by the respondents. The respondents were asked to select one or more mobile networks they use. The results show that out of the 107 that responded, 84,1% of them use MTN while about half (50,5%) of the total number of respondents use Vodafone. The users of Tigo made 16,8%, with Airtel constituting 15,9% of respondents. Expresso and Glo came last on the list of network subscription with 1,9% and 3,7% respectively. The results show that some respondents

have more than one mobile subscription. From the overall respondents, 92,5% reported to have access to internet on their phones which can be inferred that most of the respondents use smartphones or feature phones. The other 7,5% cannot access internet on their phones meaning they use dumbphones. The figure below depicts the information above.

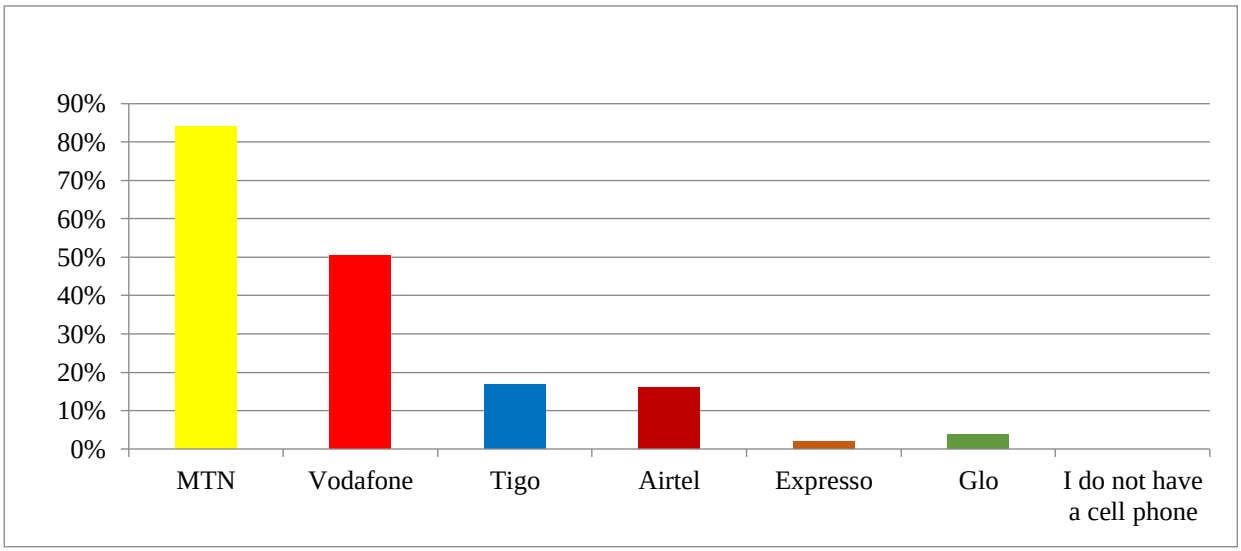

Figure 7: Network Subscription of Respondents

Knowledge of mobile money and mobile money account ownership

The respondents were asked if they have heard of the existence of mobile money.

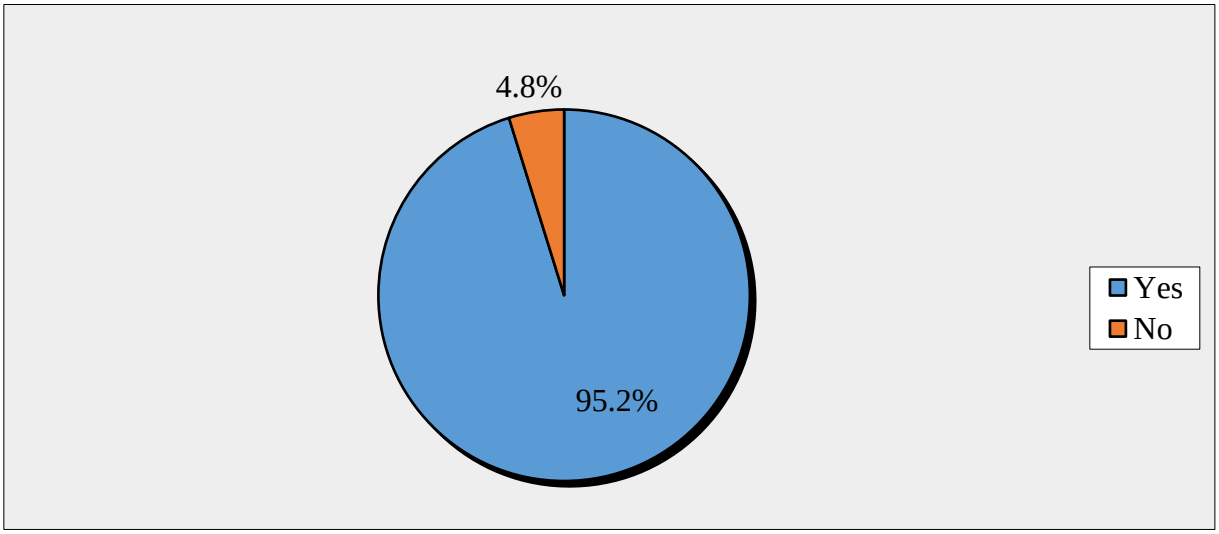

Figure 8: Mobile money account ownership

Figure 8 above depicts the results. It was no surprise that out of the 105 who responded, all of them (100%) answered "Yes" in confirmation that they have some knowledge of mobile money in Ghana This is an indication that mobile has become very popular in Ghana and almost everyone is aware of its existence. They were further asked of their ownership of mobile money accounts, the results show that only 4,8% of them do not own a mobile money account with the rest (95,2%) reporting to have one or more mobile money accounts.

Mobile money network subscription

The chart below indicates the respondents' mobile money subscription.

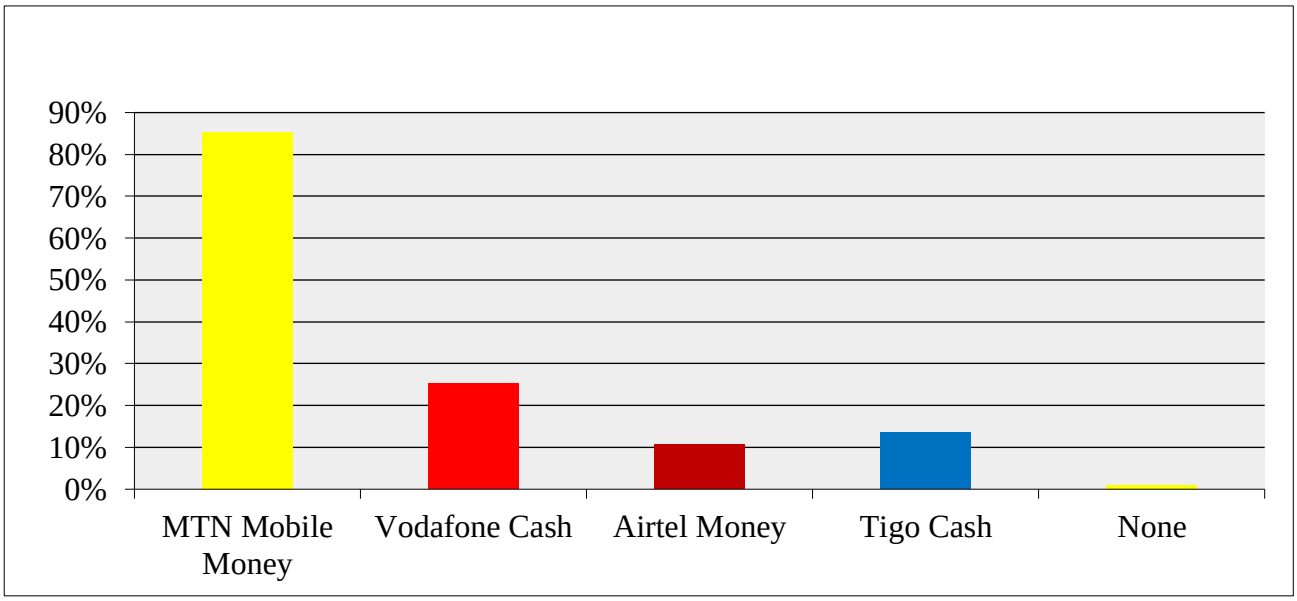

Figure 9:Mobile money network subscription of Respondents

As earlier stated, some respondents have reported of owning more than one mobile money account. They were further asked to indicate the networks they have their mobile money accounts with. Overall, 103 responded to this question. It was found out that about 85% of them own MTN Mobile Money accounts while a little above one fourth (25%) of them reported to having owned Vodafone Cash accounts. Tigo Cash account holders amounted to about 14% with Airtel Money account holders amounting to about 11%. One respondent reported of not having any mobile money account.

Usage of mobile money services

Respondents were asked which mobile money services they patronise. From Figure 10 below, the figures show that out of the 102 respondents who answered this question, 96,1% and 84,3% used mobile money for fund transfers and airtime top-ups respectively.

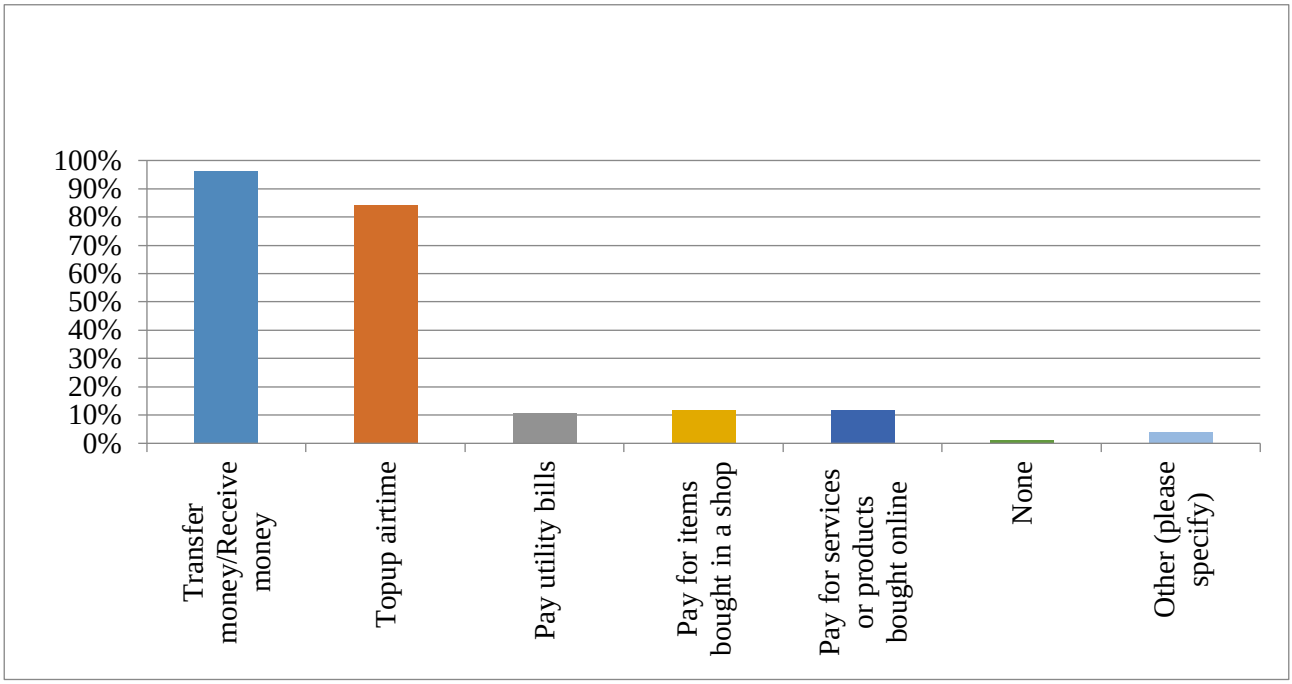

Figure 10: Mobile money services usage

It was revealed that less than 12% of users use mobile money for payments (pay utility bill; 10,8%, purchase of items in shops; 11,8% and online payments; 11,8%).

Frequency of use of mobile money services

101 Mobile money account owners were asked how often they patronize the various service offerings on mobile money in a month and here are the results; Money transfer and airtime top-up recorded the highest frequency of use. 59 respondents patronize

money transfer services more than three times (3x) a month while 57 patronize airtime top-ups more than three times a month.

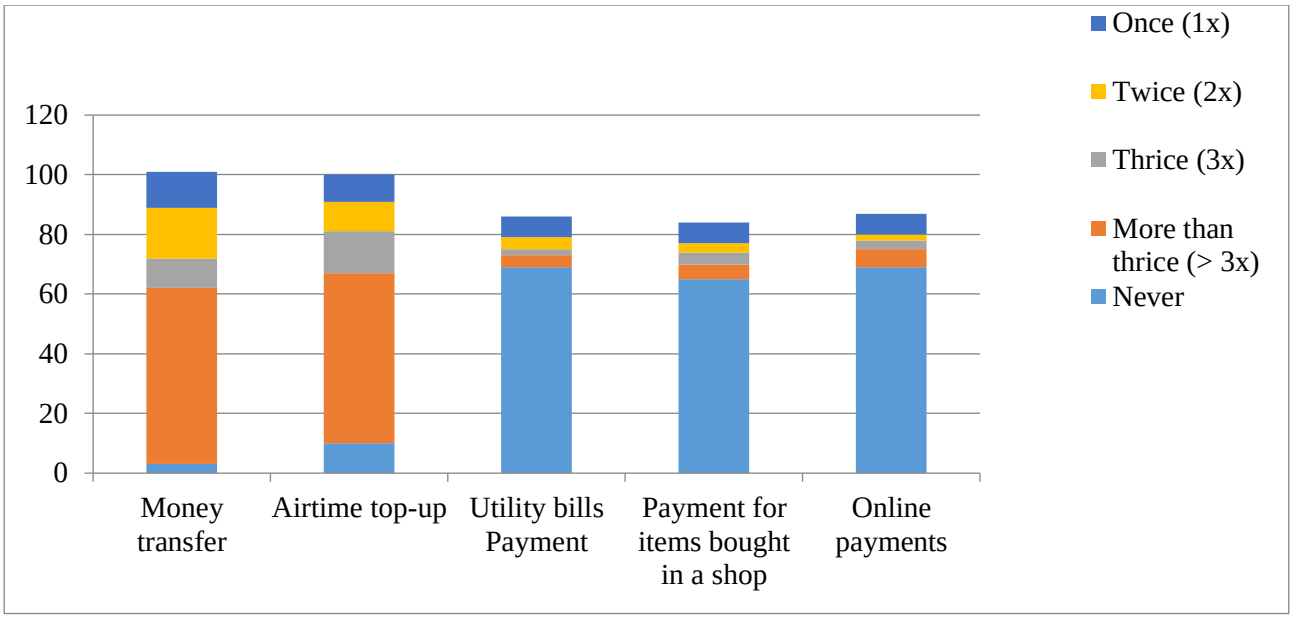

Figure 11: Monthly frequency of mobile money services patronage

Only a few section of respondents reported to use the payment services of mobile money (utility bills payments, physical shop and online payments). About 70 respondents have never used any of the payment services on mobile money.

Physical cash vs Mobile money wallet vs Bank accounts

To understand the preferences of use of cash, mobile money and bank accounts for the daily transactions of the respondents, various questions were asked about their ownership of bank accounts and whether they would like the idea to link their mobile money accounts to their bank accounts. They were also asked how often they use their bank accounts and whether they are able to use their bank accounts for online payments. Furthermore, the respondents were also asked about their knowledge of use of mobile money for payments. The results show that although a large number of the respondent own a bank account (87%), only 45% of them use it frequently while 9%

never use their bank accounts. It was also found out that 33% of the respondents are able to make online transactions using their bank accounts while 22% reported to have never attempted any online transactions using their bank accounts. This could be explained by the fact that not all bank account owners in Ghana have a access to a credit/debit card from their banks as most of these account or banks are not advanced enough.

Table 5 below gives a summary of the responses of mobile subscribers' preferences.

Table 5: Preferences for Cash vs Mobile money vs Bank accounts

Questions	**Options**	**Percentage**	**Frequency**
Bank account ownership	Yes	87	87
	No	13	13
Mobile money account linkage with bank account	Yes	67,4	60
	No	23,6	21
	Don't care	9	8
Frequency of use of bank account	Most frequently	15,6	14
	Frequently	30	27
	Less frequently	45,6	41
	Never	8,9	8
Online payments using bank account	Yes	33	30
	No	45	20
	Never buy online	22	41
Knowledge of using mobile money for payments	Yes	72	72
	No	28	28

The respondents also showed an interest in the idea of linking their bank accounts with their mobile money accounts with 67,4% in favour of the idea while 23,6% were in opposition to the idea and 9% did not show any interest or opposition.

Online Payment methods

Findings from the survey also revealed that more than half of the respondents do not make online purchases (56,6%) hence do not use any online payment method. Credit/Debit cards represent the most used online payment method (25,3%) while mobile money came second with 19,2% with other minor methods following with small numbers of users. Figure 12 depicts the overall online payment methods in use.

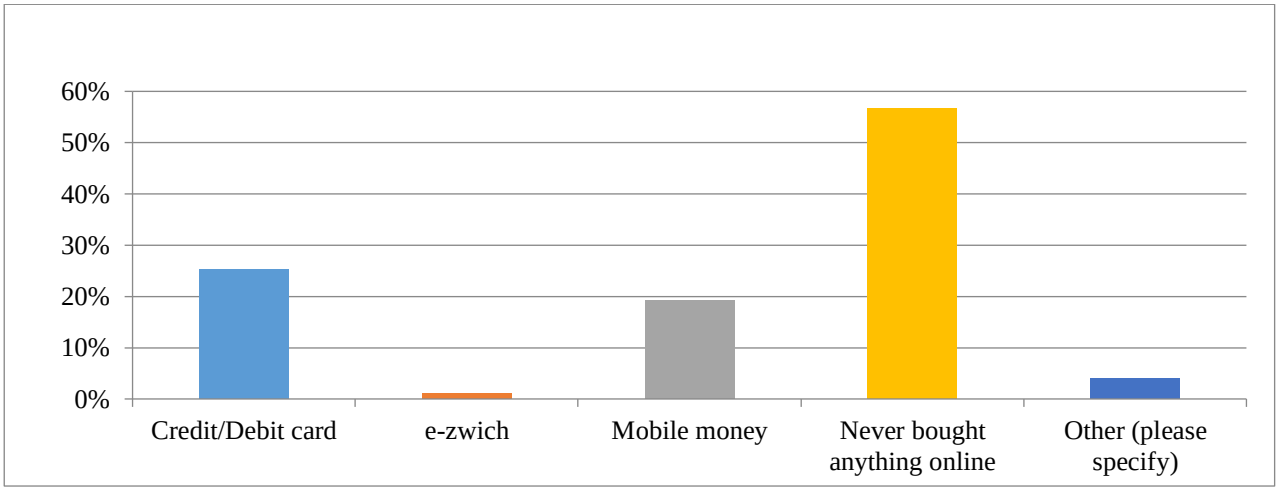

Figure 12: Usage of Online payment methods

General Payment options

To get thorough insight into the general options of payments used in Ghana, the respondents were asked to indicate which payment methods they mostly used for their daily transactions. The results as depicted in Figure 13 show that almost all (91%) of respondents mostly use cash while 14% of them reported they use mobile money whereas 9% answered to use credit/debit cards for their daily transaction. 3% of the respondents claim they use other means of payment aside cash, mobile money and credit/debit cards. These other means could be e-zwich which was not included in the options.

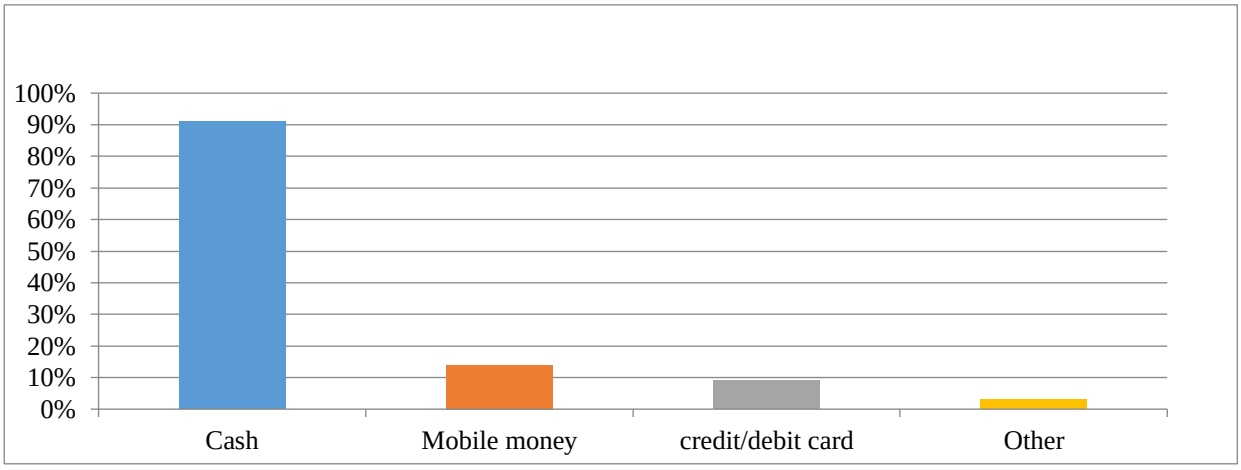

Figure 13: General payment methods

Analysis of part four of the questionnaire

In order to access the factors affecting the behavioural intentions to use mobile money for payments in Ghana, the proposed model for this study was used to analyse part four of **Survey-1**. The table below shows how the questions where structured and how the responses were measured using the constructs of the modified UTAUT.

Table 6: Measuring scales for the modified UTAUT constructs

Constructs	**Codes**	**Questionnaire statements**	**Answer options**
Performance Expectancy	PE1	I find mobile money payments beneficial	strongly disagree-strongly agree
	PE2	Mobile money has made payments easy for me	strongly disagree-strongly agree
	PE3	Mobile money is a reliable method of payment	strongly disagree-strongly agree
	PE4	Mobile money is a safe and secure method of payment	strongly disagree-strongly agree
	PE5	Mobile money is a convenient method of payment	strongly disagree-strongly agree
Effort Expectancy	EE1	Mobile money use instructions are understandable	strongly disagree-strongly agree

	EE2	Mobile money payments are easy to make	strongly disagree-strongly agree
	EE3	Learning to use mobile money is/was easy for me	strongly disagree-strongly agree
	EE4	SMS-based interface of mobile money menu	Very unsatisfied-very satisfied
Facilitating Conditions	FC1	Mobile money payment options are easily accessible	strongly disagree-strongly agree
	FC2	Mobile money agents are easily accessible in my location	strongly disagree-strongly agree
	FC3	Network stability for mobile money transactions	Very unsatisfied-very satisfied
	FC4	Customer services support with issues regarding mobile money transactions	Very unsatisfied-very satisfied
Behavioural Intention	BI1	How willing are you to use mobile money to pay for items bought in a shop	not willing - very willing
	BI2	How willing are you to use mobile money to pay for items bought online	not willing - very willing

The modified UTAUT proposed for this study as stated in chapter three consists of three independent constructs, (Performance Expectancy, Effort Expectancy and Facilitating Conditions) two dependent variables (Behavioural Intention and Use Behaviour) and three moderators (Gender, Age and Experience). In the analysis of the questionnaire, responses received from the questions framed based on the three independents constructs and the one dependent variable were measured. Five question items were asked based on the Performance Expectancy construct with each question been assigned the code PE1 to PE5 for simplicity reasons. Effort Expectancy was given 4 question items with codes EE1 to EE4. Four question items were framed under Facilitating Conditions with each question been assigned a code from FC1 to FC2. Lastly the dependent variable Behavioural Intention was give two question items with

codes BI1 and BI2. The answer options for each of the questions are indicated in the table above.

Summary of results from part four of Survey-1

The responses from the questions in table 5 were weighted from 1 to 5 as follows; strongly agree = 5; agree = 4; neither agree nor disagree = 3; disagree = 2 and strongly disagree = 1. Response types as very satisfied to very unsatisfied were also assigned weights as follows; very satisfied = 5; satisfied = 4; Neither satisfied nor dissatisfied = 3; unsatisfied = 2 and Very unsatisfied = 1. Furthermore, response types ranging from very willing to unwilling were assigned weights as follow; Very willing = 5; willing = 4; not sure =3 somewhat willing = 2; and unwilling = 1.

Table 7 below summarises the results from the responses collected. The averages from the responses were calculated and the standard deviations worked out.

Table 7: Basic statistical summary of responses

Constructs	**Codes**	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
Performance Expectancy	PE1	1	5	4,13	0,76
	PE2	1	5	3,34	0,81
	PE3	1	5	4,01	0,72
	PE4	1	5	3,91	0,78
	PE5	1	5	4	0,91
Effort Expectancy	EE1	1	5	3,72	1,27
	EE2	1	5	4,19	0,74
	EE3	1	5	4,27	0,84
	EE4	1	5	3,78	0,81
Facilitating Conditions	FC1	1	5	4,02	0,66
	FC2	1	5	4,05	0,8
	FC3	1	5	3,45	1,06
	FC4	1	5	3,26	1,04
Behavioural Intention	BI1	1	5	3,86	1,13
	BI2	1	5	3,62	1,02

Analysis of the results using the proposed model

The averages of the responses of each question item are matched against the corresponding constructs. The overall "average" of these averages were calculated for each construct as illustrated in Figure 14 below

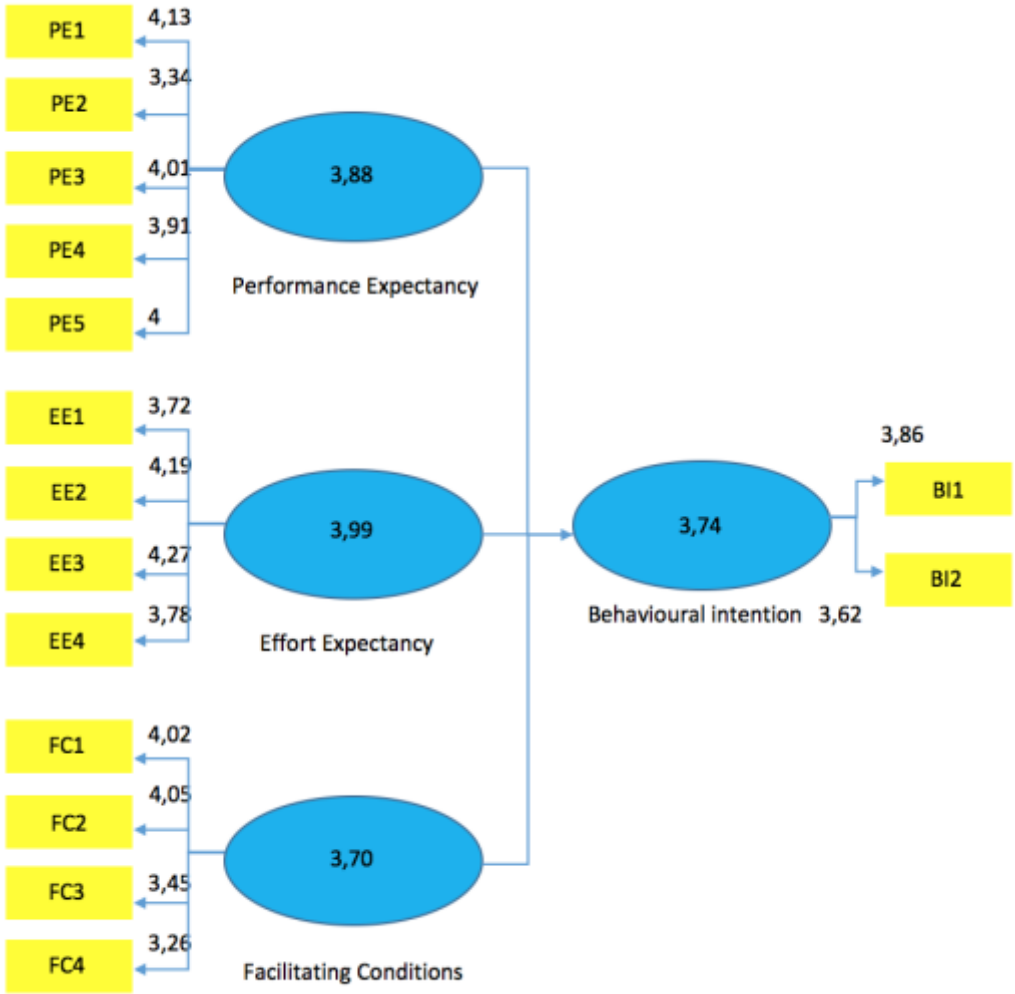

Figure 14: Modified UTAUT proposed

The values for the three independent construct show that people are more positive about mobile money payments. Performance Expectancy recorded an average of 3,88 from the measurement of the responses, this can be interpreted that most of the respondents believe mobile money payments will be or is useful to them in their daily

transactions. Although there was some variance in the answer responses, 3 out of 5 answer responses were above 4 which is above the median (3). Aside this, all the answer responses were above the median and this shows that on the average, the respondents believe that using mobile money to pay for items in their daily transactions will be beneficial and convenient for them. However, there was a low average to question item PE2 (Mobile money has made payments easy for me). This could be explained by the fact that mobile payments are currently not used by many of the respondents and so most of their responses were centred around "Neither agree nor disagree" option.

Effort Expectancy recorded the highest average (3,99) from the answer responses with 2 out of 4 answer items been above 4 (4,27 and 4,19) while the remaining 2 answer items were also above the median (3); and very close to 4. This shows that most respondents perceive that mobile money is easy to use and it is free of complexities.

Facilitating conditions recorded the lowest average among the three constructs used in this analysis. Although 2 out of 4 answer responses were above 4, the other 2 answer responses were just a little above the median. Question items about respondents' satisfaction with network stability and customer service support with regards to mobile money recorded the lowest averages. These results highlight the fact that respondents' perception about network stability and customer service support are hindrances to their use of mobile money payments. In effect, Facilitating Conditions appear to be the construct with the lowest average and hence the less significant determinant to behavioural intentions to use mobile payments in Ghana according to the survey results.

Mobile subscribers were finally asked about their intentions to use mobile money for online and physical shop payments. The responses showed that respondents are more willing to use mobile money for physical shop payments (3,86) than online payments (3.62). This could be due to the facts that most of the respondents do not make online

purchases or because others who make online payments have other means they use to pay online and so are not willing to use mobile money to do same. The overall results of the respondents' intentions to use mobile money payments show that above average number of the respondents have the intention to use mobile money payments.

Results from Survey-2

Survey-2 as mentioned earlier, was designed to get feedback from mobile money agents about their perceptions, intentions to continue offering mobile money services as agents and challenges facing them in their delivery of the service. The questionnaire was subdivided into three parts namely: general information on their mobile money transactions, perceptions and intentions to uses mobile money as agents and challenges of offering mobile money services as agents.

General information on agents' mobile money transactions

Number of years of been in service as an agent

The agents were asked to indicate the length of time they have been mobile money agents. The results showed that about half of the respondents have been agents for more than a year but less than two years. The chart below displays the findings.

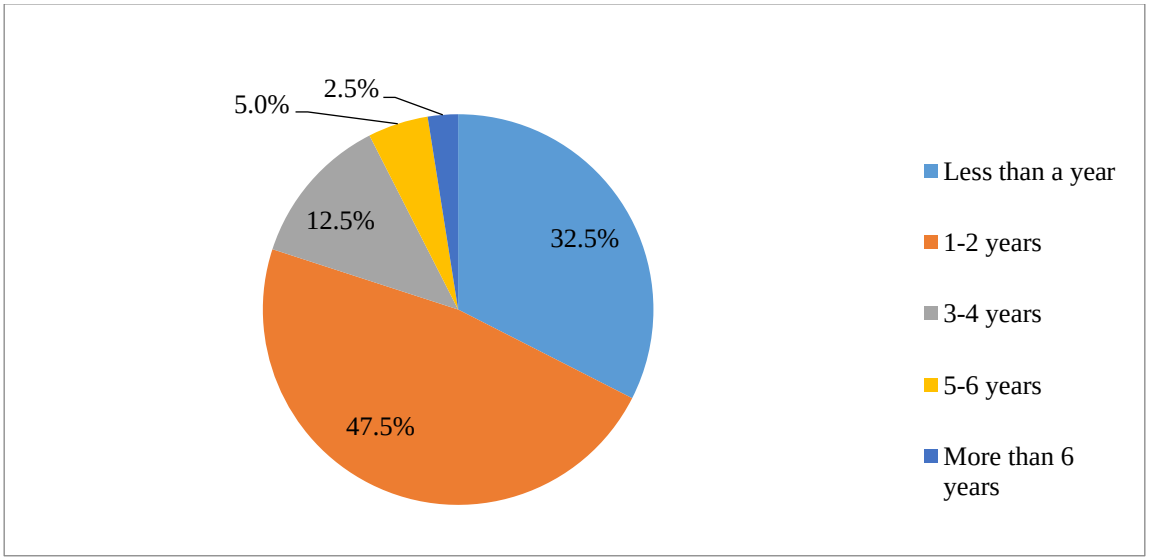

Figure 15: Number of years of been an active mobile money agent

One-third of the respondents have been agents for less than a year while 12,5% of them have been agents for 3-4 years. Those who have been agents for 5-6 years and above 6 years represented only 5% and 2,5% respectively.

Mobile money services offered

The respondents were asked which mobile money services they offer as agents; it can be seen as depicted in Figure 16 that 52,5% of the respondents answered to offer MTN Mobile money while one-fourth (25%) of them offer Tigo Cash.

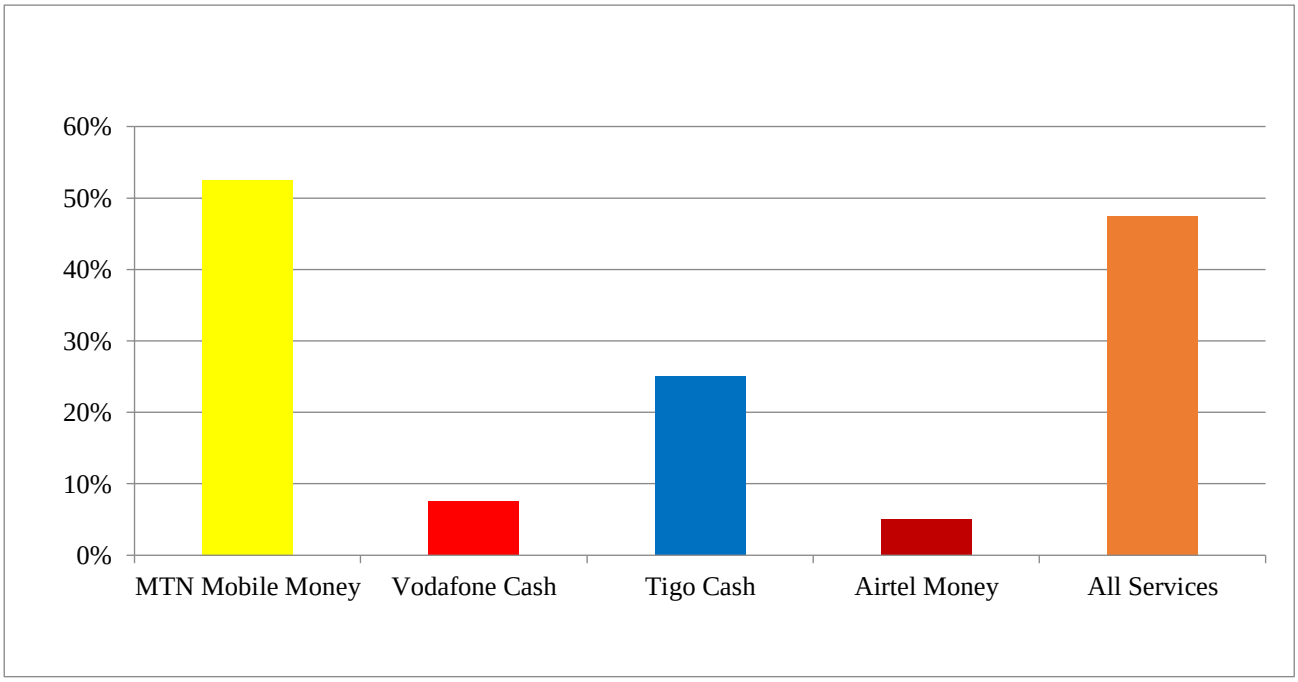

Figure 16: Mobile money services offered by agents in Ghana

The agents who offer Vodafone represents 7,5% of the total number of respondent while those that offer Airtel Money represent 5%. It was also found out that 47,5% of the respondents offer all the four mobile money service available in Ghana.

Agents' frequency of loading mobile money wallet

Agents obtain electronic cash from mobile money partner banks and this e-cash is loaded onto their mobile money wallets. The frequency of electronic cash purchases was found out and the results depicted in **Figure 17** below.

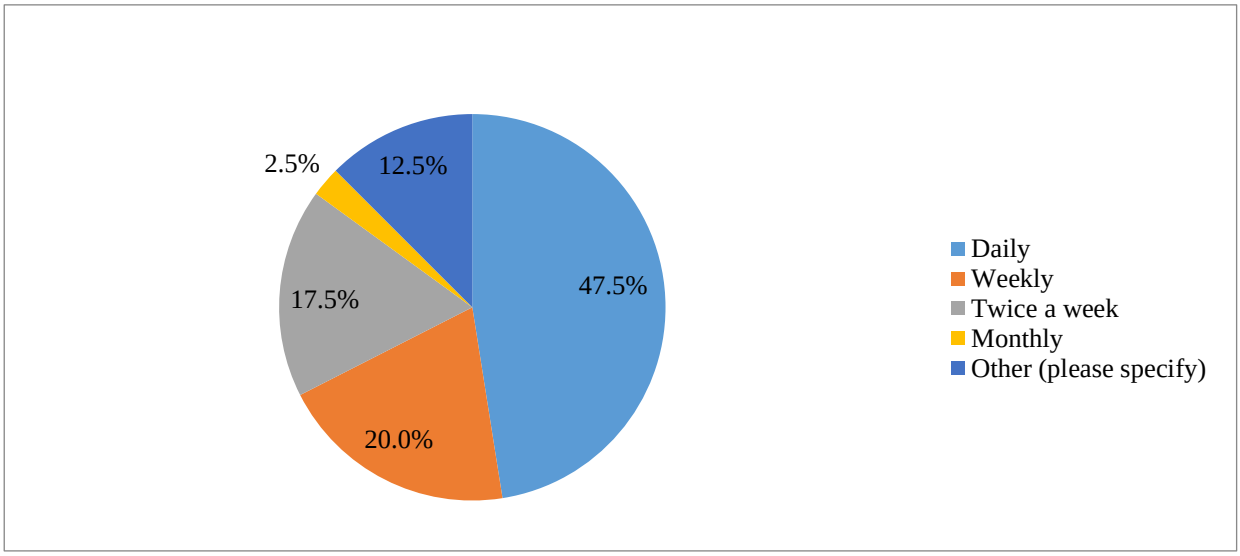

Figure 17: Agent's purchase of electronic cash

It was found out that majority of the respondents frequently purchase electronic cash. Those who make daily purchases represent 47,5% while 20% % also make weekly purchases. Bi-weekly and monthly purchasers represent 17,5% and 2,5% respectively. An interesting revelation was that 12,5% of the respondents usually do not buy electronic cash since their initial start-up capital keeps balancing itself due to almost equal values of cash-in and cash-out transactions.

It can be inferred from these results that agents do not keep electronic cash for long but buy it more frequently, averagely on a daily basis.

Transaction values and volumes

In order to put some figures against agents' activities, the amount of electronic cash usually purchased by the agents were requested. The respondents were asked to indicate range of amount of electronic cash they usually purchased. The figure **below** shows the results.

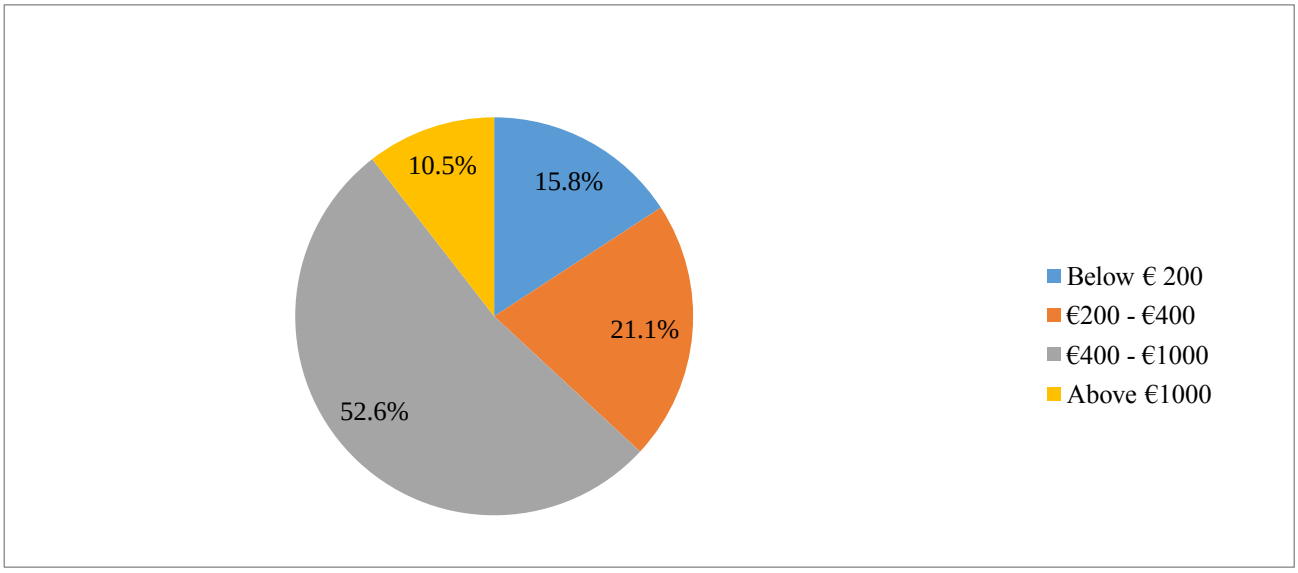

Figure 18: Amount of electronic cash purchased by agents

The initial values where quoted in the local currency (Ghana Cedi) but were convert to Euros at the time of writing this paper to create a better understanding from an international perspective. The results show that only 15,8% of agents mostly purchase electronic cash below €200. Agents whose purchases are between €200 and €400 make up 21,1%% while purchases of between €400 and €1000 are made by 52,6% of the agents. Only 10,5% of the agents indicated that they make purchases above €1000.

It can therefore be concluded that most of agents make electronic cash purchases between €200 and €1000 daily. It was also found out that the agents make on the average, 76 transactions daily with these transaction volumes varying from as low as 10 to 1000 transactions daily.

Mobile Money registration process

To assess the complexities associated with customers' registration for mobile money, the agents were asked to indicate the degree of difficulty or ease of the registration process. The figure **below** depicts the outcomes.

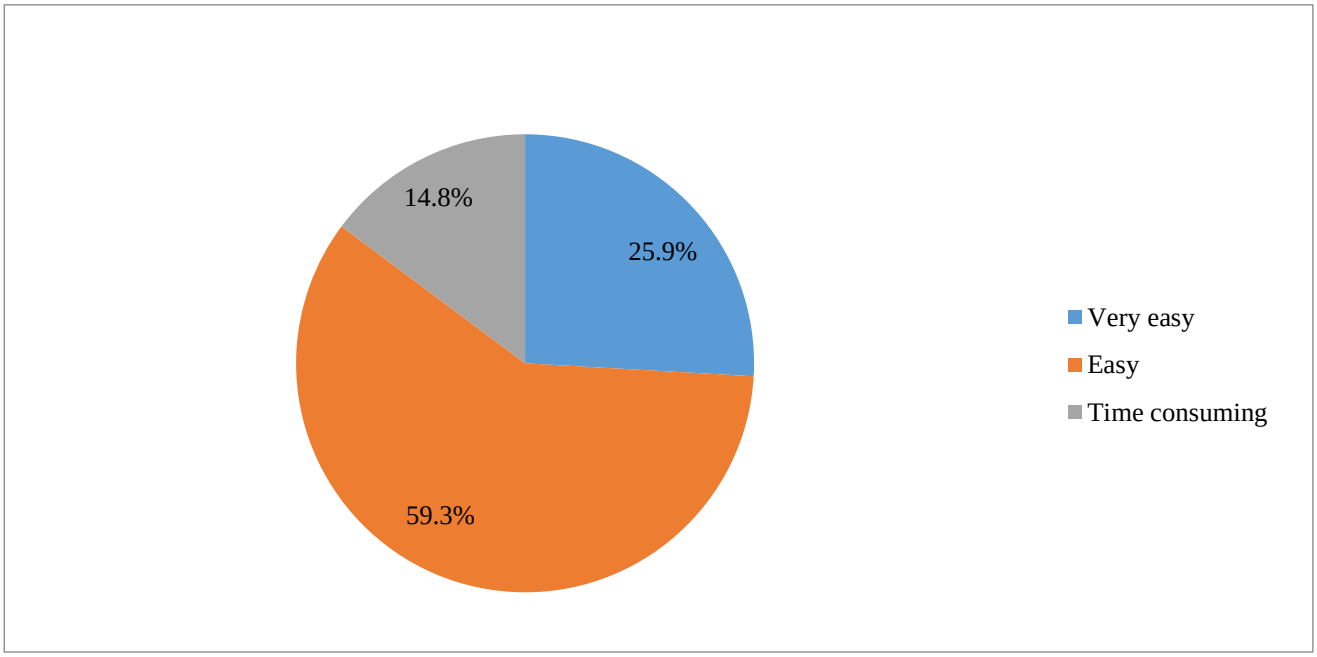

Figure 19: Level of difficulty of registration process

It was found out that 48% of agents were not authorized to register users for mobile money. Of the 52% that were authorized to register new mobile money subscribers, 25,9% of them indicated that the registration process was very easy while 59,3% reported the process to be easy. Only 14,8% of the agents authorized to register new subscribers reported that the process was time consuming. Overall, in can be inferred that mobile money registration for a new subscriber is easy.

Agents' assessment of frequency of patronage of mobile money services

Again, to validate users' frequency of patronage of the various mobile money service offerings, the agents were asked to indicate how often customers patronize the services. The table **below** shows the findings.

Table 8: Agents' assessment of frequency of patronage of mobile money services

	Never (1)	less Frequently (2)	Neutral / Not sure (3)	Frequently (4)	Most Frequently (5)
Make deposits (cash-in)	0.00% 0	7.50% 3	5.00% 2	60.00% 24	27.50% 11
Withdraw money (Cash out)	0.00% 0	0.00% 0	2.50% 1	32.50% 13	65.00% 26
Transfer money	2.50% 1	20.00% 8	2.50% 1	40.00% 16	35.00% 14
Top up airtime	37.50% 15	35.00% 14	10.00% 4	12.50% 5	5.00% 2
Pay bills	60.00% 24	32.50% 13	7.50% 3	0.00% 0	0.00% 0

From the table above, bill payment services recorded the lowest frequency of patronage where 60% of agents reported their customers never made bill payment transactions with 32,5% reported the use of the service is less frequent. On the other hand, cash deposits (cash-in), cash withdrawal (cash-out) and money transfer recorded high frequencies of patronage. This gives an indication from the agents' point of view that users of mobile money mostly use it to transfer money to their relatives and make airtime top-ups which is consistent with results from survey-1.

This shows that much education must be focused on the bill payment aspect of mobile money since the results show that most users are well aware and have become accustomed to traditional mobile money transfer services but less aware of the bill payment services. Special attention must be given to the bill payment services as Ghana strives to promote digital payments and transform the economy into a cashless economy.

Agents' assessment of use of mobile money

In order to further understand the factors affecting the use of mobile money services in Ghana, it was important to assess the distribution channels through which mobile money is disseminated to the population. The major mobile money distribution channels are the agent networks and the banks. In this section, the results from the agents' assessment are presented. The agents were asked to indicate the degree to which they agree or disagree with given statements related to the use of mobile money. The responses were collected and the median of the responses for each question item was calculated to make interpretation straightforward and simple.

Statements	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Median
It is very easy for wrong transactions to be corrected	7	12	4	11	6	3,00
In my opinion Mobile Money is very profitable	2	2	3	28	5	4,00
I easily get electronic cash to purchase	2	4	3	19	12	4,00
A lot of people patronize the mobile money services	0	1	0	16	23	5,00
I have a stable network for my transactions	1	7	5	20	7	4,00
The transaction charges are affordable	2	6	2	25	5	4,00
There are a lot of merchants competing with me in my area	0	8	2	13	17	4,00
Most of my customers have mobile money accounts	0	1	0	19	20	4,50
The money I collect from customers is safe with me	1	2	0	24	13	4,00
I will recommend others to become Mobile Money merchants	1	3	5	26	5	4,00
My customers understand how the mobile money services work	2	7	1	23	7	4,00
My customers are satisfied with the Mobile Money services	2	3	2	25	8	4,00
I am considering stopping the Mobile Money business	16	18	4	2	0	2,00
I get good customer service support when transactions go wrong	2	9	8	16	5	4,00
I am satisfied with the Text-based interface of the mobile money menu	0	2	3	23	12	4,00

Table 9: Agents' assessment of use of mobile money

It was found out that about half of the respondents disagreed with the statement that *"it was very easy for wrong transactions to be corrected"* but contrastingly the other half of the respondents agreed with the statement. When the respondents were asked about the mobile money business profitability, 83% of them agreed that the business was very profitable as most of the agents (57,5%) strongly agreed that a lot of people patronize the services. It came as no surprise when most of the agents (85%) disagreed with the statement "*I am considering stopping the Mobile Money business*". It can be inferred from this that due to the high profitability of the mobile money services, the agents are willing to continue offering the services.

The agents also strongly agreed that most of their customers have mobile money accounts. It was also confirmed by most agents that mobile money customers understand how the services work and they are very satisfied with the services (70% and 83% respectively) while also confirming that mobile money transaction charges are affordable for their customers. Ease of access to electronic cash to purchase got high numbers of positive feedback as 71% of the respondents agreed that they easily get electronic cash to purchase.

Above average responses (67,5%) were received in terms of network stability while only 20% of the respondents disagreed that the network was stable for their transactions to go through, the remaining 12,5% of them remained neutral in their responses. Most of the agents (75%) agreed that there were a lot of other agents competing with them, but interestingly, 77,5% of them still agreed that they will recommended mobile money to potential agents. Almost all agents (87,5%) also agreed that they were satisfied with the text-based interface of the mobile money menu but the responses were split when they were asked about the customer service support they received when transactions go wrong; 52.5% of the respondents agreed that they get good customer service support while 27,5% disagreed and 12,5% of them remained neutral.

Challenges faced by mobile money agents

The agents where further asked to write down some of the challenges they face in delivering mobile money services that were not covered in the questionnaire. Only 19 out of 40 of the agents responded and most of their responses were similar. Below is a list of some of the most relevant challenges mentioned by the agents

1. **Liquidity**

   Some of the respondents mentioned the lack of capital to inject into the mobile money business and so in effect, they quickly runout of electronic cash and are unable to service their customers at crucial times. Another liquidity challenge mentioned by some of the respondents was the shortage of electronic cash during public holidays as banks who are the main channel through which agent purchase electronic cash are not opened.

2. **Lack of interoperability**

   The inability of users to make off-net transactions was also mentioned as a major challenge facing the delivery and use of mobile money services. The Lack of interoperability means that agents only have to resort to token-based transactions which they complained about as been too cumbersome.

3. **Delays in reversal of wrong transactions**

   The agents also mentioned that sometimes mistakes happen when customers come to transfer money and they misquote their phone number and the money is sent to a wrong number. The reversal of these wrong transactions, the agents said, takes days to be completed which makes them runout of e-cash sometimes. In cases where money meant to be sent into a recipient's wallet is mistakenly sent as airtime, the network operators are unable to reverse such transactions thereby resulting is losses for the party responsible for the error.

Chapter Five

Discussion and Conclusion

Introduction

This final chapter discusses and summarizes the findings and results of the research. Furthermore, it addresses other topics such as the research's limitations, recommendations and finally conclusion of the whole research.

Discussion

In this section, the findings of the research are presented in a way to answer the research questions. The results of the analysis are discussed under the headings of the related research questions as follows:

1. What is the current status of mobile money with regards to payments in Ghana?

The findings from this study showed that almost every adult Ghanaian owns a mobile phone and all mobile phone users are aware of the existence of mobile money services in the market. While only a meagre portion of mobile phone users do not own a mobile money account, it was revealed that 95.2% of mobile phone users own one or more mobile money accounts as compared to the less than 20% (MTN, 2017) who owns a bank account in Ghana. MTN, Ghana's largest MNO leads the market share of mobile money subscribers followed by Vodafone, Tigo and Airtel in that order.

The use of mobile money for payment of products and services is at a low rate with less than 12% of mobile money account owners using the service for payment purposes. (utility bills, purchase of items from shops and online payments). The other two major services on mobile money (airtime top-up and fund transfer) get high

patronages as high as 96,1% and 84,3% respectively. In an interview (see **Appendix 3a**) with two MNOs, (MTN and Vodafone) to get their perspectives on the payment aspect of mobile money, MTN claimed their topmost priority mobile money service offering among the three major mobile money services (airtime top-up, fund transfer and bill payment) is bill payment. These include online payments, point of sales and peer-to-peer payments. MTN's claim that payment is their topmost priority service offering on mobile money does not reflect much on the findings from the user survey, meaning there is still lot of work to be done to get the payment aspect of mobile money to match-up with the other service offering on mobile money.

In another interview with Vodafone (see **Appendix 3b**), the company reported that their topmost priority services are airtime top-up and fund transfers on mobile money. This shows that Vodafone is not much into the payments aspect of mobile money as much as MTN is committed to the course. Ecobank, the lead mobile money partner bank in Ghana in an exclusive interview (**Appendix 3c**) also revealed that they have offloaded some of their services onto the mobile money platform in order to reach those in remote parts of Ghana to have access to some payment medium through which they can make bill payments such as school fees payments and other utility bill payments.

2. What are the factors that affect the adoption of mobile money-payments in Ghana?

This section aims to answer the second research question with respect to the variables of the proposed UTAUT research model: Performance Expectancy (PE), Effort Expectancy (EE) and Facilitating Conditions (FC) and their relationship with the dependent variables, behavioural intention (BI) and use behaviour (USE). The variables are discussed as follows.

Performance Expectancy

In this study, the performance expectancy used is the degree to which mobile phone users believe that using mobile money services will help them in their daily transactions in terms of benefits: convenience, time saving, safety and security. The research results are in support of the first variable of the proposed research model which states that performance expectancy (PE) positively predicts behavioural intention (BI) to use mobile money services. The effect of performance expectancy (PE) on behavioural intention (BI) was significant and it reflects the perceived benefits obtained from using mobile money services. This goes a long way to suggests that the users' performance expectancy for mobile money services might be increased by focusing on the usefulness of mobile money services and the availability of the services through the agent networks, shops collecting payments through mobile money as well as e-commerce platforms. In other words, if the advantages and benefits of mobile money services are demonstrated and promoted to users in an interactive manner, the acceptance and use of mobile money services, in particular payment services would most likely increase. This result is consistent with a previous research finding from de, Abrahão, Moriguchi, & Andrade, (2016).

Effort Expectancy

The effort expectancy (EE) variable in this study is defined as the degree of ease associated with the use of mobile money services in Ghana. It was measured by the perception of ease of learning and using the various mobile money services and also the effort that has to be put in to using the services. The linkage between effort expectancy (EE) and behavioural intention (BI) in this study was the most significant and was very much supported by the research findings. This result shows that most users perceive that mobile money is easy to use and it is free of complexities which confirms that users are willing to adopt an easy to use service which demanded little

effort to accomplish their daily transactions. Mobile money payment services should further be made simple, easy to understand and use and with a user friendly interface in order to increase user adoption. These findings are consistent with the results of other studies reviewed in this paper; Tobbin and Kuwornu (2011) and de, Abrahão, Moriguchi, & Andrade, (2016).

Facilitating Conditions

In this study, facilitating conditions (FC) refer to the availability of distribution channels, points of sales, and technical resources that are used to support the use of mobile money services. It was measured by assessing the perception of ease of service accessibility, network stability for transactions and customer service support with regards to mobile money. The study results confirmed that facilitating conditions (FC) have a direct and significant effect on usage behaviour however, it has less significance as performance expectancy (PE) and effort expectancy (EE) has on behavioural intention (BI). This finding is consistent with Venkatesh et al., (2003)'s UTAUT validation test which posits that "*FC appears to be fully moderated by effort expectancy, such that, when both PE and EE are present, FC becomes non-significant in predicting intention*". Facilitating conditions in the case of this study are however not insignificant but appeared to be moderated by the presence of EE and PE. As facilitating conditions play an important role in usage of the mobile money payment services, it is necessary that the mobile money stakeholders put the right conditions both technological and human resources in place to foster adoption and use of the service. This result is in line with the study findings by (Mugambe, 2017).

Aside the factors covered under the research model, there are other factors affecting the adoption and use of mobile money payments in Ghana that will be discussed below. The assessment of mobile money services from the agents' perspective revealed that most of the facilitating conditions are in place for mobile money payments to take off expect that there are some few hurdles that need to be addressed by the appropriate

stakeholders. The lack of interoperability within the mobile money services providers is one of the major problems identified to be hindering mobile money payments like point of sales payments and peer-to-peer off-net transactions. However, MTN and Ecobank confirmed that it is possible for Airtel and MTN subscribers to link their mobile money accounts to their bank accounts and this is only available with only 10 banks currently in Ghana. They are working on it to expand to include more banks. In an interview with the Manager of MTN mobile money operations to throw more light on the interoperability issue, she stated *"Platforms across the different Telco operators are not interoperable. The government has initiated a project to develop systems around Interoperability through GhIPSS. No timeline provided as at now"*. GhIPSS is Ghana Interbank Payment and Settlement System, a subsidiary of the Bank of Ghana whose mandate is to implement and manage interoperable payment system infrastructure for banks and non-bank financial institutions in Ghana.(GhIPSS, 2017)

3. How can the use of mobile money as a medium of payment be improved?

The results from both surveys and interviews with the stakeholders have revealed that the adoption gap of mobile money payment services is not much of a demand-side problem but rather a supply-side problem that needs to be given serious attention by the major stakeholders. This is because almost every mobile subscriber owns one or more mobile money account whether active or non-active, which is an enormous opportunity for mobile money payments to take off. The major problem is the unavailability of mobile money points of payments to attract the users to use the services. To look at the way forward, the researcher asked the two leading mobile money operators in an interview of their plans going forward to tackling the deficiency in supply of the payment services. According to MTN, the company is forging a heavy drive this year to setup over 100,000 points to accept mobile money payments across the country. Vodafone on the other hand as the second largest market shareholder of

mobile money subscribers do not have any plans in place to promote the payment aspect of mobile money, instead, the manager of Vodafone Cash operations, said *"No big plans from the company's side. We are available to any business who wants to use our payment services"*.

In order to promote mobile money as a medium of payment, the MNOs responsible have to realise that there is a big opportunity out there to reap from. The MNOs have to adopt a Multi-Sided Platform (MSP) business model approach to draw in merchants as well as users to use the services. The researcher has exploited Kazan & Damsgaard, (2013)'s digital payment framework to assess the largest mobile money operator in Ghana in order to ascertain that a general MSP business model approach is the way forward to achieving gains in promoting mobile money payments in Ghana.

Table 10: Digital Payment framework analysis of MTN mobile money as a MSP

Criteria: MSP	MTN
Direct Interaction	MTN fulfils the criteria of a MSP since it enables direct interactions between merchants and mobile money subscribers by being the Mobile money platform provider for businesses and users.
Network Effect	If MTN gets its supply-push strategy right, the planned deployment of the 100,000 points of payment would create a cross-side network effect as more merchants will adopt these point of sales services knowing that almost every mobile subscriber owns a mobile money account to make such payments.
Homing Cost	MTN mobile money subscribers will have low or zero homing costs, since they already own a mobile money account capable of making payments. For the merchants, costs are high since they have to sign up for the point of sales services at a fee.
Switching Cost	MTN subscribers would have medium to high switching costs, due to contractual commitments, the lack interoperability. Merchants have to absorb high switching costs, due to acquirer contracts.
Bundling/Envelopment	Bundling voice and data services with mobile money payments increases the value proposition of MTN. Envelopment can occur from banks and other fin-tech start-ups try to offer similar payment services.
Platform Design	As at now MTN's mobile money services are not interoperable with other operators

	but the project put in place by the government could soon make this possible.
Technological Solution	MTN's mobile money technology is SIM based and since they issue the SIM cards, they own the customer relationship.

From the table it is evident that if all the mobile money operators size the opportunity to strategize as multi-sided payment platform provides, their large user base will attract merchants to adopt the mobile payment service and take payments through this medium. The mobile money operator should also find a balance between making the service free for the users and focus on monetising the service from the merchant as the users could easily fall back to using cash if they have to incur any transaction costs.

Another way to promote mobile money payments is for the government to liberalise the mobile money market for the MNO's to operate freely in the interest of both the users and the merchants. The government should also encourage bulk disbursements where payments are made by an organisation via a mobile money platform to a person's mobile money account. For example: salary payments made by a company to an employee's mobile money wallet or payments made by the government to a recipient's mobile money wallet. When this is done, the recipient will almost always have money in his or her mobile money wallet and therefore will be motivated to use it for direct payments instead of cashing it out before.

Lastly, another means by which mobile money payment could be promoted is for the government to enforce the newly enacted regulation: *'Schedule for Payment of Mobile Money Interest to Customers'* as this approach to distributing Interest among users of the mobile money service is now an incentive to use mobile money. This will attract more users onto the platform and the more users there are, the more digital payments will be made using the platform.

4. How can e-commerce platforms make the most out of mobile money as a payment medium to boost their businesses

E-commerce platforms have a lot to gain from the advent of mobile money payments. Customers who could not make online payment before will now be able to make online payment when mobile money payments reach its peak based on the above discussed points. One key innovation the mobile money industry as seem recently is the launching of GSMA Mobile Money APIs. E-commerce platform operators can take advantage of this innovation and integrate mobile money payment options into their platforms using these APIs. Furthermore, the MNO's have made merchant registration procedures simple for both physical businesses as well as online businesses by leveraging the KYC procedures.

Third party payment solution providers in Ghana have also entered agreement with some mobile money providers to integrate mobile money payments into websites of online shops. This initiative although much more expensive than the GSMA mobile money APIs, is also another alternative for ecommerce to exploit to expand their payment options to customers. A renowned example of such third party company is Kopo Kopo. which is a mobile money aggregator.

Conclusion

This thesis contributes to the research and practice of mobile money payment adoption and use in Ghana by presenting the current state of affairs in terms of mobile money payment in Ghana. It has also identified some of the major factors affecting the use of mobile money payments and going further to suggest ways to improve uptake of mobile money payments in Ghana from the stakeholders' perspective.

In a country where bank accounts and credit/visa cards ownership is below 50% of the adult population, mobile money account ownership seem to be a great opportunity to exploit in deepening financial inclusion and widening payment digitisation in Ghana. With 71% of the nation's population owning mobile money accounts, there is a potential huge market for mobile payment the mobile money operators can take advantage of if they adopt the right strategies. Looking at the volumes and values of mobile money transactions in Ghana over the past year (550.218.427 transactions and $18 billion respectively) this is a potential big market yet to be fully exploited.

It was found out that less that 12% of the respondents use mobile money for payments compared to the 96,1% and 84,3% that use the service for fund transfers and airtime top-ups. Using a modified UTAUT to determine the factors affecting the adoption and use of mobile money payments in Ghana, it was found out that the most significant determinant to behavioural intentions (BI) to use mobile money payments was effort expectancy (EE). Performance expectancy and Facilitating conditions were also found significant determinants to behavioural intentions. It was also found out that users are more willing to use mobile money to pay from physical shops than from online shops. One major problem with the mobile money services is the lack of interoperability which makes it impossible for off net transaction. However, it was confirmed that there are plans underway to develop interoperable systems for the mobile money services.

The MSP supply-push strategy was concluded to be the ultimate way for the mobile money operators to promote mobile money payments in Ghana with their major

customers been the merchants and users. Online businesses have the opportunity now to integrate the all new GSMA mobile money APIs into their platforms to make payment collections easy and simple.

Limitations

This study produced good and valid results however, just like any other research, it is not free of limitations. There were two main limitations identified with this study: geographical scope, and the inability to interview all the stakeholders.

The geographical scope was defined to be Ghana but most of the respondents were located mainly in Accra, the capital city of Ghana. This was due to time and funds constraints on the researcher to reach out to other parts of the country to gather data. This to some extent might make results bias and not represent the status of the entire country. It is therefore, important that in future researches, data is gathered from as many parts of the country as possible.

The researcher also could not interview all the stakeholders as was the plan initially. Most especially, no ecommerce business was interviewed to get more insights into the current status of online payments and their perception about mobile money payments. This was partly due to insufficient time in the field to follow up on the prospective interviewees and partly due to the inability of the prospective interviewees to offer the interviews. Although more interview could have made the validation of the results better, the validity of this study is considered good enough as other relevant sources were reached to gather the needed data to complete this study. However, future researches should aim to add more qualitative data for a stronger validation.

Recommendations and Future work

As the mobile phone world is fast advancing and users are moving away from the dumbphone to feature phones and smartphones, it is recommended that a design of a smartphone interface for mobile money should be the next big plan for the mobile money operators and developers. In this modern technological era, USSD and SIM toolkit hierarchical menu interfaces might be a factor keeping many users away from intensively using mobile money services for payment. Smartphone interfaces not only have the chance to make basic transactions simpler, but they can potentially address a host of other barriers. For instance, services can be presented more transparently, listing transactions costs on the fly. Therefore, future researches should look at the possibilities and the effects a smartphone interface for mobile money will have on mobile money payments.

References

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behaviour.

Armstrong, M. (2006). Competition in two-sided markets. *The RAND Journal of Economics*, *37*(3), 668-691.

Au, Y. A., & Kauffman, R. J. (2001). Should we wait? Network externalities, compatibility, and electronic billing adoption. *Journal of Management Information Systems*, *18*(2), 47-63.

Babatz, G. (2013). Sustained effort, saving billions: Lessons from the Mexican government's shift to electronic payments. *Better Than Cash Alliance Case Study*. http://betterthancash.org

World Bank, (2014). The Opportunities of Digitizing Payments: Key Findings and Recommendations for Governments. http:// siteresources.worldbank.org/EXTGLOBALFIN/Resources/ 8519638-1332259343991/G20_Report_Final_Digital_payments.pdf

Caillaud, B., & Jullien, B. (2003). Chicken & egg: Competition among intermediation service providers. *RAND journal of Economics*, 309-328.

Carr, M. (2007). Mobile payment systems and services: an introduction. In *Mobile Payment Forum* (pp. 1-12).

CGAP, (2015). http://www.cgap.org/blog/new-data-finds-mobile-money-cusp-rwanda-and-ghana

Cull, R., Demirgüç-Kunt, A., & Morduch, J. (2014). Banks and microbanks. *Journal of Financial Services Research, 46(1), 1-53.*

Dahlberg, T., Mallat, N., Ondrus, J., & Zmijewska, A. (2008). Past, present and future of mobile payments research: A literature review. *Electronic Commerce Research and Applications*, *7*(2), 165–181. http://doi.org/ 10.1016/j.elerap.2007.02.001

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. Management Science, 35(8), 982-1003.

de Sena Abrahão, R., Moriguchi, S. N., & Andrade, D. F. (2016). Intention of adoption of mobile payment: An analysis in the light of the Unified Theory of Acceptance and Use of Technology (UTAUT). *RAI Revista de Administração e Inovação*, *13*(3), 221-230.

GhIPSS, (2017) http://ghipss.net/index.php

GSMA Intelligence, (2017). https://www.gsmaintelligence.com

GSMA. (2012). What makes a Successful Mobile Money Implementation? Learnings from M-PESA in Kenya and Tanzania. Retrieved from www.gsmworld.com/membership

GSMA. (2016a). State of the Industry Report.

GSMA. (2016b). Success factors for mobile money services. Retrieved from https://www.gsmaintelligence.com/research/?file=923539C02F5D39174BA09C6851EFC25A&download

GSMA. (2017a). 2016 State of Mobile Money in West Africa. Retrieved from http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/04/2016-State-of-Mobile-Money-in-Western-Africa.pdf

GSMA. (2017b). State of the Industry Report on Mobile Money, *Decade Edi*. Retrieved from http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/03/GSMA_State-of-the-Industry-Report-on-Mobile-Money_2016.pdf

Hagiu, A. (2014). Strategic Decisions for Multisided Platforms. *MIT Sloan Management Review*, *55*(2), 71–80. Retrieved from http://sloanreview.mit.edu/article/strategic-decisions-for-multisided-platforms/

ITU (2013). The Mobile Money Revolution – Part 1: NFC Mobile Payments https://www.itu.int/dms_pub/itu-t/oth/23/01/T23010000200001PDFE.pdf

Jack, W., Ray, A., & Suri, T. (2013). Transaction networks: Evidence from mobile money in Kenya. The American Economic Review, 103(3), 356-361.

Kalba, K. (2016). Explaining the Mobile Money Adoption- Usage Gap. *Digiworld Economic Journal*, *3*(103). Retrieved from www.comstrat.org

Karnouskos, S. (2004). Mobile payment: a journey through existing procedures and standardization initiatives. *IEEE Communications Surveys & Tutorials*, *6*(4).

Katz, M. L., & Shapiro, C. (1985). Network externalities, competition, and compatibility. *The American economic review*, *75*(3), 424-440.

Katz, M. L., & Shapiro, C. (1986). Technology adoption in the presence of network externalities. *Journal of political economy*, *94*(4), 822-841.

Kauffman, R. J., & Wang, Y. M. (2002). The network externalities hypothesis and competitive network growth. *Journal of organizational computing and electronic commerce*, *12*(1), 59-83.

Kazan, E., & Damsgaard, J. (2013). A Framework For Analyzing Digital Payment As A Multi-Sided Platform: A Study Of ree European NFC Solutions. *European Conference on Information Systems (ECIS)*.

Kripanont, N. (2007). *Examining a technology acceptance model of internet usage by academics within Thai business schools (Doctoral dissertation, Victoria University).*

Mallat, N., & Tuunainen, V. K. (2008). Exploring merchant adoption of mobile payment systems: An empirical study. *E-service Journal*, *6*(2), 24-57.

Mbiti, I., & Weil, D. N. (2011). *Mobile banking: The impact of M-Pesa in Kenya* (No. w17129). National Bureau of Economic Research.

Mugambe, P. (2017). UTAUT Model in Explaining the Adoption of Mobile Money Usage by MSMEs' Customers in Uganda. *Advances in Economics and*

Business, *5*(3), 129–136. http://doi.org/10.13189/aeb.2017.050302

Multi-tech, (2007) SIM Application Toolkit http://www.multitech.com/documents/ publications/manuals/s000391c.pdf

Musa, A., Khan, H. U., & AlShare, K. A. (2015). Factors influence consumers' adoption of mobile payment devices in Qatar. *International Journal of Mobile Communications*, *13*(6), 670-689.

NCA, (2017) http://www.nca.org.gh/industry-data-2/market-share-statistics-2/ voice-2/

Omol, E. J., Ogalo, J. O., Abeka, S. O., & Omieno, K. K. (2016). Mobile Money Payment Acceptance Model in Enterprise Management: A Case Study of MSE's in Kisumu City, Kenya, *1*(2), 1–12.

Parker, G. G., & Van Alstyne, M. W. (2005). Two-sided network effects: A theory of information product design. Management science, 51(10), 1494-1504.

Pénicaud, C., & Katakam, A. (2013). State of the industry 2013: mobile financial services for the unbanked. *GSMA. Available at: http://www. gsma. com/ mobilefordevelopment/wp-content/uploads/2014/02/SOTIR_2013. pdf*.

Rochet, J. C., & Tirole, J. (2003). Platform competition in two-sided markets. *Journal of the european economic association*, *1*(4), 990-1029.

Rogers, E. M. (1995). Diffusion of Innovations: modifications of a model for telecommunications. In Die Diffusion von Innovationen in der Telekommunikation (pp. 25-38). Springer Berlin Heidelberg.

Rogers, E. M. (2003). Elements of diffusion. *Diffusion of innovations*, *5*, 1-38.

Shapiro, C., & Varian, H. R. (1999). Information Rules: A Strategic Guide to the Network Economy'Harvard Business School Press, 1999. *ISBN 087584863X*.

Shrier, D., Canale, G., & Pentland, A. (2016). Mobile Money & Payments: Technology Trends. *Massachusetts Institute of Technology*.

Tobbin, P., & Kuwornu, J. K. M. (2011). Adoption of mobile money transfer technology: structural equation modelling approach. *European Journal of Business and Management*, *3*(7), 59–78. Retrieved from http://www.iiste.org/Journals/index.php/EJBM/article/view/593

World Bank (2014) http://ufa.worldbank.org/country-progress/ghana

Wu, Y. L., Tao, Y. H., & Yang, P. C. (2007, December). Using UTAUT to explore the behaviour of 3G mobile communication users. In Industrial Engineering and Engineering Management, 2007 IEEE International Conference on (pp. 199-203). IEEE.

Zhou, T. (2013). An empirical examination of continuance intention of mobile payment services. Decision Support Systems, 54(2), 1085-1091

Appendix 1

Mobile Money questionnaire for mobile phone users

IMPORTANT*

Please only fill out this questionnaire if you currently live in Ghana and use a mobile phone. It takes only 5 -10mins.

This questionnaire is centred around the use of Mobile Money as a medium of payment in Ghana. The first part is some general questions about you.

Your feedback will be used in a research "Payment digitisation in Ghana via Mobile Money" as part of my master's thesis.

Section A

Demographic information about respondent

1. What is your gender?

- ◯ Female
- ◯ Male

2. What is your age?

- ◯ Below 18
- ◯ 18 to 24
- ◯ 25 to 34
- ◯ 35 to 44
- ◯ Above 44

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

- ◯ Basic
- ◯ JHS
- ◯ SHS
- ◯ Tertiary
- ◯ None

4. What is your employment status

- ◯ Student
- ◯ Employed
- ◯ Self-employed
- ◯ Unemployed
- ◯ Retired

5. In which income group do you belong?

- ◯ 0-500ghs/month
- ◯ 500-1000ghs/month
- ◯ 1000-1500ghs/month
- ◯ above 1500ghs/month
- ◯ Don't want to answer

Network Subscription and Mobile Money (MM) Usage

6. Which of the following mobile networks do you use? (Please select all that apply.)

- ☐ MTN
- ☐ Airtel
- ☐ I do not have a cell phone
- ☐ Vodafone
- ☐ Expresso
- ☐ Tigo
- ☐ Glo

7. Can you access internet on your phone?

- ○ Yes
- ○ No
- ○ Don't know

8. Have you heard of mobile money (MM)?

- ○ Yes
- ○ No

9. Do you have a Mobile Money account (MM)?

- ○ Yes
- ○ No

10. Which of the following mobile money accounts do you have?

- ☐ MTN Mobile Money
- ☐ Airtel Money
- ☐ Vodafone Cash
- ☐ Tigo Cash

11. Which of the following services do you use on mobile money? (Please select all that apply)

- ☐ Transfer money/Receive money
- ☐ Pay utility bills
- ☐ Pay for services or products bought online
- ☐ Topup airtime
- ☐ Pay for items bought in a shop
- ☐ Other (please specify)

12. How often do you use any of the following mobile money services in a month?

	Once (1x)	Twice (2x)	Thrice (3x)	More than thrice (> 3x)	Never
Transfer Money/Receive money	○	○	○	○	○
Topup airtime	○	○	○	○	○
Pay utility bills	○	○	○	○	○
Pay for items bought in a shop	○	○	○	○	○
pay for online products and service	○	○	○	○	○

13. Are you able to make MM account to account transactions with users on different networks?

- ◯ Yes
- ◯ Don't know
- ◯ No

14. Would you like to be able to make MM account to account (A2A) transactions with users on different networks?

- ◯ Yes
- ◯ Don't care
- ◯ No

Section C

Physical cash vs Mobile money wallet vs Bank accounts

15. Do you have a bank account?

- ◯ Yes
- ◯ No

16. Would you like to link your mobile money account to your bank account?

- ◯ Yes
- ◯ No
- ◯ Don't have a mobile money account
- ◯ Not sure

17. How often do you do transactions with ur bank account?

- ◯ Most Frequently
- ◯ Less Frequently
- ◯ Frequently
- ◯ Never

18. Which payment method(s) do you use when buying products/services online?

- ☐ Credit/Debit card
- ☐ Mobile money
- ☐ e-zwich
- ☐ Never bought anything online
- ☐ Other (please specify)

19. Which payment methods do you use most often when buying products and services?

- ☐ Cash
- ☐ credit/debit card
- ☐ Mobile money
- ☐ Other

20. Do you know you can use mobile money to pay for items bought both online and in a physical shop?

- ◯ Yes
- ◯ No

21. Are you able to make online payments using your bank account?

- ◯ Yes
- ◯ No
- ◯ Don't make online payments

22. How willing are you to use mobile money to pay for the following?

	Very willing	Willing	Not sure	somewhat Willing	Not willing
Items bought in a physical shop	◯	◯	◯	◯	◯
Services or items bought online	◯	◯	◯	◯	◯

Section D

Challenges of Mobile Money Payments

23. Indicate the degree to which you agree or disagree with the following

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Agree strongly
Mobile money use instructions are understandable	◯	◯	◯	◯	◯
Mobile money payments are easy to make	◯	◯	◯	◯	◯
Learning to use mobile money is/was easy for me	◯	◯	◯	◯	◯

24. Indicate the degree to which you agree or disagree with the following

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Agree strongly
I find mobile money payments beneficial	○	○	○	○	○
Mobile money payment options are easily accessible	○	○	○	○	○
Mobile money has made online payments easy for me	○	○	○	○	○
Mobile money has made shop payments easy for me	○	○	○	○	○
Mobile money has made utility bills payments easy for me	○	○	○	○	○
Mobile money agents are easily accessible in my location	○	○	○	○	○

25. Indicate the degree to which you agree or disagree with the following

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Agree strongly
Mobile money is a reliable method of payment	○	○	○	○	○
Mobile money is a safe and secure method of payment	○	○	○	○	○
Mobile money is a convenient method of payment	○	○	○	○	○

26. Indicate how satisfied you are with the following

	Very unsatisfied	Unsatisfied	Not sure	Satisfied	Very satisfied
Network stability for mobile money transactions	○	○	○	○	○
Customer services support with issues regarding mobile money transactions	○	○	○	○	○
SMS-based interface of mobile money menu	○	○	○	○	○
Daily transaction limits	○	○	○	○	○

Appendix 2

Mobile Money Payment questionnaire for agents in Ghana

IMPORTANT*

This questionnaire is centred around the use of Mobile Money as a medium of payment in Ghana and the challenges it faces. It takes only 3 - 6mins. Your feedback will be used in a research "Payment digitisation in Ghana via Mobile
Money" as part of my master's thesis.

Welcome to the Survey!

1. How long have you been a Mobile Money merchant/agent?

- ◯ Less than a year
- ◯ 1-2 years
- ◯ 3-4 years
- ◯ 5-6 years
- ◯ More than 6 years

2. Which of the following services do you offer

- ☐ MTN Mobile Money
- ☐ Vodafone Cash
- ☐ Tigo Cash
- ☐ Airtel Money
- ☐ All of the above

3. How often do you purchase electronic cash?

- ◯ Daily
- ◯ Weekly
- ◯ Twice a week
- ◯ Monthly
- ◯ Other (please specify)

4. How much electronic cash do you often purchase?

- ◯ Below GH¢ 1,000
- ◯ GH¢ 1,000 - 2,000
- ◯ GH¢ 2,000 - 5,000
- ◯ Other (please specify)

5. On the average, how many transactions do you make a day?

6. Are you able to transfer money to others on different networks?

◯ Yes ◯ No ◯ Don't know

7. How is the mobile money registration process for a new customer?

- ◯ Very easy
- ◯ Easy
- ◯ Time consuming
- ◯ Almost impossible

8. Please indicate the frequency with which your customers come to conduct these Mobile Money services.

	Never	less Frequently	Neutral / Not sure	Frequently	Most Frequently
Make deposits (cash-in)	◯	◯	◯	◯	◯
Withdraw money (Cash out)	◯	◯	◯	◯	◯
Transfer money	◯	◯	◯	◯	◯
Top up airtime	◯	◯	◯	◯	◯
Pay bills	◯	◯	◯	◯	◯

9. Please indicate the extent to which you agree or disagree with each of the following statements

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
It is very easy for wrong transactions to be corrected	○	○	○	○	○
In my opinion Mobile Money is very profitable	○	○	○	○	○
I easily get electronic cash to purchase	○	○	○	○	○
A lot of people patronize the mobile money services	○	○	○	○	○
I have a stable network for my transactions	○	○	○	○	○
The transaction charges are affordable	○	○	○	○	○
There are a lot of merchants competing with me in my area	○	○	○	○	○
Most of my customers have mobile money accounts	○	○	○	○	○
The money I collect from customers is safe with me	○	○	○	○	○
I will recommend others to become Mobile Money merchants	○	○	○	○	○
My customers understand how the mobile money services work	○	○	○	○	○
My customers are satisfied with the Mobile Money services	○	○	○	○	○
I am considering stopping the Mobile Money business	○	○	○	○	○
I get good customer service support when transactions go wrong	○	○	○	○	○
I am satisfied with the Text-based/SMS-based interface of mobile money menu	○	○	○	○	○

10. What challenges do you encounter as a Mobile Money agent?

……

……

Appendix 3a

Interview by: Ruth Badoo, Manager, MTN Mobile Money Operations

1) **From your company's point of view what factors are driving the adoption and use of mobile money services in Ghana?**

Ans. High demand due to convenience, reliability and coverage/reach. MTN currently covers the whole of Ghana and service is widely available across country. Currently has a subscriber base of over 9 million and agents spread of over 60,000 nationwide.

2) **What challenges do your company face in relation to delivering MM services to its customers?**

Ans. Level of education and use by some customers, especially rural communities, person to person fraud.

3) **Which stage of development has mobile money reached in Ghana in your opinion?**

Ans. Intermediary with very high growth rates in the past three years

4) **Apart from agents and banks, through which other channels do you reach your MM customers?**

Ans. Attached document gives some more insights into channels

5) **Does your company has enough agents to serve your numerous customers?**

Ans. Yes, we are currently spreading heavily into the semi-urban and rural areas.

6) **Among the 3 major services on Mobile money; Money transfer, Airtime purchase and bill payments (general payments) which is your company's top most priority?**

Ans. Payments (Online, POS, P2P etc.)

7) **What plans are your company putting in place to promote the payment (bill) aspect of mobile money?**

Ans. Heavy drive this year to setup over 100,000 points to accept payments across the country. Expansion of online presence with projects such as VISA & MasterCard Integration to wallet.

8) **How is the procedure like for businesses (both physical shops and online businesses) who want to incorporate mobile money payment options into their businesses?**

Ans. Refer to attached document

9) **Do you think the payment aspect of mobile money will ever catch-up with the other major mm service offerings?**

Ans. YES

10) **How secure is Mobile Money since it has only a 4-digit password which is visible upon entry?**

Ans. Mobile Money adheres to strict security protocols based on accredited industry standards. We are ISO 27001 certified. Further security details available in the attached document.

11) **What is the interoperability status of MTN mobile money? Are A2A and B2M transactions possible? If not, what is the way forward?**

Ans. Platforms across the different Telco operators are not interoperable. The government has initiated a project to develop systems around Interoperability through GhIPSS. No timeline provided as at now.

12) **How stable is your network to support mobile money operations without failures (success rate of transactions)?**

Ans. Good stability and widest coverage in Ghana. Mobile Money platform has 100% redundancy in case of any failures, there is a switchover.

13) **Could you provide me with MTN Mobile Money subscription statistics, if possible?**

Ans. See attached document

14) **What do you think about linking Mobile Money accounts to customers' bank accounts?**

Ans . Service is currently available. We have 10 banks so far and counting who are linked to our Mobile Money wallets.

Appendix 3b

Summary of transcribed interview by: Juliana Frimpong. Operations Manager, Vodafone Cash

1. **From your company's point of view what factors are driving the adoption and use of mobile money services in Ghana?**

Ans: Need to send money to relatives

2. **What challenges do your company face in relation to delivering MM services to its customers?**

Ans: Vodafone came into the market as 4th player when the market was already saturated. Also size of agent networks… now trying to deploy more agents into the market

3. **Which stage of development has mobile money reached in Ghana in your opinion?**

Ans: Intermediary stage

4. **Apart from agents and banks, through which other channels do you reach your MM customers?**

Ans: Agents and banks are the only distribution channels

5. **Does your company has enough agents to serve your numerous customers?**

Ans: 7000 agents, But still not enough, still working on it.

6. **Among the 3 major services on Mobile money; Money transfer, Airtime purchase and bill payments (general payments) which is your company's top most priority?**

Ans: Airtime purchase, and transfer

7. **What plans are your company putting in place to promote the payment (bill) aspect of mobile money?**

Ans: No big plans from the company's side. We are available to any business who wants to **use our payment services**

8. **How is the procedure like for businesses (both physical shops and online businesses) who want to incorporate mobile money payments options into their business?**

Ans: The business has to register as a merchant and go through the KYC procedures

9. **Do you think the payment aspect of mobile money will ever catch-up with the other major mm service offerings?**

Ans: It depends on the customers. If they are willing to adopt the use of the services

10. **How secure is Mobile Money since it has only a 4-digit password which is visible upon entry?**

Ans: The USSD technology doesn't make it possible **to mask the pin. But the STK technology makes it possible to mask the pin we at Vodafone finds the STK technology expensive to deploy therefore, we only use the USSD**

11. **What is the interoperability status of MTN mobile money? Are A2A and B2M transactions possible? If not, what is the way forward?**

Ans: No interoperability as of now.

12. **How stable is your network to support mobile money operations without failures (success rate of transactions)?**

Ans: 99.99% service availability but the success rate depends on other factors

13. **Could you provide me with MTN Mobile Money subscription statistics, if possible?**

Ans: 1.2 million users

14. **What do you think about linking Mobile Money accounts to customers' bank accounts?**

Ans: As at now Vodafone cash is not linked with bank account but it will be possible in the future.

Appendix 3c

Summary of transcribed Interview by: Berthold P. J. Gadagbui Head, Ecobank Mobile and Internet banking (Ghana)

1. **Do you see mobile money as a threat or an opportunity to the banking industry?**

Ans. Ecobank is the principal bank partnering with all mobile money providers
This is more of an opportunity and we both complement each other

2. **Does mobile money pose a threat to payments solutions offered by your bank?**

Ans. We have put some of our services on mobile money e.g. DSTV, school fee collection. When this is done, revenue is shared between the bank and the telcos

3. **Which e-commerce payment solutions do you offer and how is its faring in the market?**

Ans. Ecobank passport payment.

4. **What do you think about linking MM accounts to customers' bank accounts?**

Ans. Possible on Airtel and MTN, reduces queues at banks and reach to those in remote areas to access banking services through mobile money

5. **What role is your bank playing in digitising payments in Ghana?**

Ans. Educating and advertising digital payments all over the country

6. **In your opinion do you think Mobile money is the way forward to a cashless economy?**

Ans. Mobile phones are the least expensive channel through which digitization can be achieved as the other means are expensive.