

UNIVERSITY OF GHANA

**EFFECT OF GRATIFICATION ON USER ATTITUDE AND
CONTINUANCE USE OF MOBILE PAYMENT TECHNOLOGIES: A
DEVELOPING COUNTRY CONTEXT**



BY

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INFORMATION SYSTEMS**

JULY, 2020

DECLARATION

I, **MUFTAWU DZANG ALHASSAN**, do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other University. All references used in the work have been fully acknowledged.



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CERTIFICATION

I hereby certify that this thesis was supervised in accordance with procedures laid down by the University.



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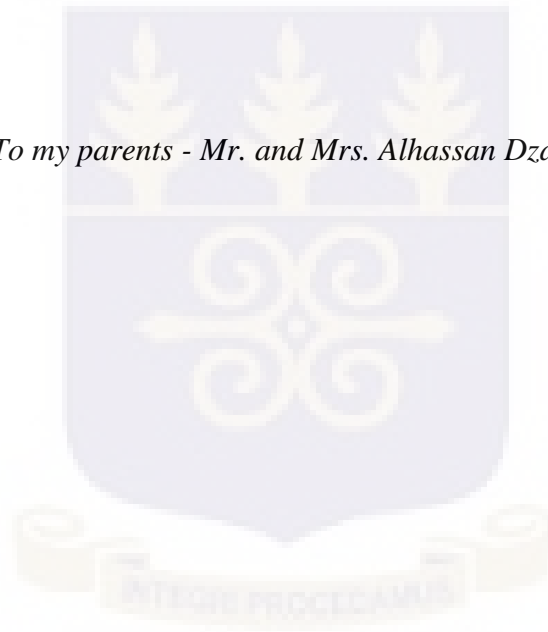
30th April 2020

Date



DEDICATION

To my parents - Mr. and Mrs. Alhassan Dzang.



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I would first like to thank the Almighty Allah for His guidance and protection throughout my two years stay at the University of Ghana.

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TABLE OF CONTENTS

DECLARATION	i
CERTIFICATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF ABBREVIATIONS	ix
LIST OF TABLES	xi
LIST OF FIGURES	xiii
ABSTRACT	xv
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background.....	1
1.2 Research Problem	3
1.3 Research Purpose	5
1.4 Research Objectives.....	5
1.5 Research Questions.....	5
1.6 Significance of Research.....	6
1.7 Chapter Outline.....	7
CHAPTER TWO	10
LITERATURE REVIEW	10
2.1 Introduction.....	10
2.2 Financial Technology Evolution.....	10
2.3 Financial Technology Defined.....	12
2.4 FinTech Ecosystem.....	15
2.5 Financial Technology Innovations.....	17
2.5.1 Cryptocurrencies and Blockchain	18
2.5.2 Artificial Intelligence and Machine Learning.....	19
2.5.3 Peer to Peer Lending.....	19
2.5.4 Equity Crowdfunding.....	20
2.5.5 Mobile Payments Services.....	21
2.6 Nature of Mobile Payments Services in Ghana	22
2.7 Classification of Mobile Payment.....	26

2.7.1 Hardware Makers.....	27
2.7.2 Operating System Makers.....	27
2.7.3 Platform Service Providers	27
2.7.4 Financial Institutions.....	28
2.8 Trends of Mobile Payments	28
2.9 Mobile Payment Requirements in FinTech Space.....	29
2.9.1 Convenience.....	30
2.9.2 Mobile Payment Infrastructure	30
2.9.3 Security	30
2.9.4 Compatibility	31
2.10 Mobile Payment Service Security.....	31
2.10.1 Mutual Authentication	31
2.10.2 Authorization	32
2.10.3 Integrity.....	32
2.10.4 Availability	32
2.10.5 Privacy	32
2.10.6 Atomicity	33
2.11 Mobile Payment Services Research: Issues and Evidence	33
2.11.1 Adoption and Determinants of Mobile Payments.....	36
2.11.2 Security of Mobile Payments.....	38
2.12 Conceptual Approaches to Mobile Payment Adoption and Use	39
2.12.1 Technology Acceptance Model	40
2.12.2 Diffusion of Innovations Theory	41
2.12.3 Unified Theory of Acceptance and Use of Technology	43
2.13 Geographical Issues in Mobile Payment Research.....	45
2.14 Research Gaps and Directions for Future Research	45
2.15 Chapter Summary	46
CHAPTER THREE	47
THEORY AND HYPOTHESIS DEVELOPMENT	47
3.1 Introduction.....	47
3.2 Uses and Gratification Theory	47
3.3 Hypothesis Development.....	49

3.3.1 Cognitive and Attitude toward the use of Mobile Payments	49
3.3.2 Hedonic and Attitude toward the use of Mobile Payments	51
3.3.3 Integrative and Attitude toward the use of Mobile Payments.....	52
3.3.4 Ease of use and Attitude toward the use of Mobile Payments.....	53
3.3.5 Convenience and Attitude toward the use of Mobile Payments	55
3.3.6 Usefulness and Attitude toward the use of Mobile Payments	55
3.3.7 Attitude and Continuance use intention of Mobile Payments	57
3.4 Summary	59
CHAPTER FOUR.....	60
RESEARCH METHODOLOGY	60
4.1 Introduction.....	60
4.2 Research Paradigm.....	60
4.3 Research Methods.....	63
4.3.1 Questionnaire Development.....	63
4.3.2 Survey Design.....	64
4.3.3 Participants Setting	65
4.3.4 Sample Selection.....	65
4.3.5 Data Collection Process	66
4.4 Method of Data Analysis	67
4.4.1 Partial Least Square in Structural Equation Modelling	67
4.5 Chapter Summary	69
CHAPTER FIVE	70
RESULTS AND ANALYSIS	70
5.1 Introduction.....	70
5.2 Demographic Characteristics of Respondents	70
5.3 Assessment of Measurement Model	73
5.3.1 Indicator Reliability	73
5.3.2 Internal Consistency Reliability.....	75
5.3.3 Convergent Validity.....	76
5.3.4 Discriminant Validity.....	77
5.4 Structural Model Assessment	82
5.4.1 Assessing Structural Model for Multicollinearity Issues.....	82

5.4.2 Assessing Structural Model for the Significance of Path Coefficient	83
5.4.3 Assessing the Goodness of Fit	85
5.4.4 Assessing the Effect Size	87
5.4.5 Assessing the Predictive Relevance.....	88
5.5 Moderating Variables.....	89
5.5.1 Income.....	89
5.5.2 Education	90
5.6 Chapter Summary	91
CHAPTER SIX	92
DISCUSSION OF RESULTS	92
6.1 Introduction.....	92
6.2 Gratification of Mobile Payment Users	92
6.2 Effect of Moderators of the Constructs.....	97
6.4 Chapter Summary	100
CHAPTER SEVEN.....	101
SUMMARY, CONCLUSION, AND RECOMMENDATIONS	101
7.1 Introduction.....	101
7.2 Answers to the Research questions.....	102
7.2.1 Nature of Mobile Payment in Ghana	102
7.2.2. Gratifications Obtained from Mobile payment use	103
7.3 Mapping out Research Objectives with Research Findings and Contributions.....	103
7.4 Research Contributions and Implications	107
7.4.1 Implication to Research	107
7.4.2 Implication for Practice and Policy.....	108
7.5 Limitations and Recommendation for Future Research	109
REFERENCES.....	110
APPENDIX A: SAMPLE QUESTIONNAIRE	128

LIST OF ABBREVIATIONS

AI	Artificial Intelligence
ATM	Automated Teller Machine
AVE	Average Variance Extracted
CB-SEM	Covariance Based-Structural Equation Modelling
DOI	Diffusion of Innovations
GOF	Goodness of Fit
FinTech	Financial Technology
HW	Hardware
HTMT	Heterotrait-Monotrait Ratio
ICT	Information and Communication Technology
IS	Information Systems
MoMo	Mobile Money
OS	Operating System
PLS-SEM	Partial Least Squares - Structural Equation Modelling
P2P	Peer-to-Peer
PIN	Personal Identification Number
RQ	Research Question
SEM	Structural Equation Modelling
SRMR	Standardized Root Mean Squared Residual
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action

UTAUT	Unified Theory of Acceptance and Use of Technology
U&G	Uses and Gratification
USSD	Unstructured Supplementary Service Data
VIF	Variance Inflation Factor
WWW	World Wide Web

LIST OF TABLES

Table 2. 1 Scholarly definitions of FinTech	13
Table 2. 2. Roles of the various elements in the FinTech ecosystem	17
Table 2. 3. Mobile Money Services	24
Table 2. 4 Mobile banking	25
Table 2. 5 Internet Banking	26
Table 2. 6 Recent mobile payment services trends	29
Table 2. 7 Studies on Mobile Payment	34
Table 2. 8. Summary of Conceptual Approaches to Mobile Payment Adoption and Use	40
Table 4. 1 List of constructs and the number of items used in the study	65
Table 5. 1 Demographic distribution of Respondents	72
Table 5. 2 Construct Reliability	76
Table 5. 3 Indicator Item Cross Loading	78
Table 5. 4 Discriminant Validity (Fornell-Larcker Criterion)	79
Table 5. 5 Discriminant Validity- Heterotrait-Monotrait Ratio (HTMT) Error! Bookmark not defined.	
Table 5. 6 Discriminant Validity: Bootstrapping for Heterotrait-Monotrait Ratio (HTMT).....	81
Table 5. 7 Multicollinearity Statistics (Inner VIF)	82
Table 5. 8 Direct relationship for Hypothesis Testing	85
Table 5. 9 R Squared.....	86
Table 5. 10 Goodness of Fit (SRMR criteria).....	86
Table 5. 11 f-square	87
Table 5. 12 q square (q ²)	88

Table 5. 13 Multi-group analysis results of income	90
Table 5. 14 Multi-group analysis results for education	90
Table 7. 1 Mapping Research Objectives to Findings and Contributions ...	Error! Bookmark not defined.

LIST OF FIGURES

Figure 2. 1 FinTech ecosystem (Adopted from Lee and Shin, 2018).....	16
Figure 3. 1 Research Model	58
Figure 5. 1 Results of PLS analysis	74
Figure 5. 2 Hypothesis Testing for Direct Effect.....	84

ABSTRACT

Advances in Information and Communication Technology (ICT) has led to the rapid and wide diffusion of mobile phones in Africa. This gives consumers in the financial services industry many new services. Thus, mobile payments emanating from Financial Technology have enabled individuals to carry out transactions from anywhere and at any time on their mobile devices. However, despite the numerous merits of this disruptive technology, there exist limited studies in this area of Information systems research especially in sub-Saharan Africa, Ghana. The attention of extant research has largely been placed with the initial adoption and use of mobile payments. Post-adoption studies on mobile payments have seldom been carried out. In addition, previous studies on initial adoption have largely focused on the functional benefits derived from mobile payments and how it influences the adoption and use of this service. For these studies, mobile payment is a service that gives functional value to its users, rather than a non-functional one. To fill this gap, this study leans on the foundations of the Uses and Gratifications Theory and a quantitative survey approach as its methodological lens to identify and examine the gratifications driving the attitude and continuance use of mobile payments in Ghana specifically Mobile Money and Mobile Banking.

By analyzing data in SmartPLS, the results indicate that Integrative, Ease of use, and Usefulness gratifications were found to significantly influence attitude towards mobile payment use. In addition, Attitude towards mobile payment use was found to significantly influence the continuance use intention of mobile payments. Furthermore, the study examined the moderating effects of income and education on the various constructs of the model adopted for this study. Findings suggest that creating a favorable ICT environment will positively influence users to adopt

and use mobile payment services. An enabling ICT environment in the form of ICT access and infrastructure will equip individuals with the necessary tools to conduct mobile payments. Similarly, an enabling environment in the form of ICT legislation and policy will ensure that the user's financial information is protected and secured. Finally, the study recommends future research on the Uses and Gratification Theory in comparatively studying other developing countries.

CHAPTER ONE

INTRODUCTION

1.1 Background

Advancement in Information and Communication Technology (ICT) has contributed to Africa's rapid and wide proliferation of mobile phones. This brings a wide range of new services to customers in the financial services industry (Chang, Wong, Lee, and Jeong, 2016). Over the years, the capabilities of ICT have been harnessed to automate financial sector transactions. Thus, Financial Technology (FinTech) has recently emerged and increasingly being adopted by businesses. The term FinTech emanated from the blend of the words “Financial” and “Technology” (Ryu, 2018). FinTech refers to an economic sector consisting of companies that adopt and use technology to make financial systems more efficient (McAuley, 2014).

Progressively, FinTech has become a metaphor for technologies that disrupt the traditional way of offering financial services by enabling individuals to make payments, transfer monies, access and request for loans, raise funds, manage assets and perform other banking transactions on mobile platforms (Mathur, Karre, Mohan, and Reddy, 2018). This therefore enable individuals to conduct financial transactions at their convenience anywhere and anytime on their mobile device (Nicoletti, 2019; Wang, Hahn, and Sutrave, 2016; Yonghee, Young-Ju, Jeongil, and Jiyoung, 2016). Examples of key FinTech innovations are mobile payments, cryptocurrencies and block chain, artificial intelligence and machine learning, equity crowdfunding, peer-to-peer loans, and new digital advisory and trading (Philippon, 2016).

The evolution of the mobile payment services market which is led by easy payment services is regarded as the fastest growing FinTech service sector (Yonghee *et al.*, 2016). New mobile payment systems (e.g. Apple pay, K pay, Android pay, AliPay) have reshaped the mobile payment service industry by allowing individuals to access their cash and conduct business at their convenience from any part of the world (Kang, 2018; Wang *et al.*, 2016; Yonghee *et al.*, 2016). As of 2017, a third of the internet users worldwide reported using a mobile payment service with the highest rates in China and India (Statista, 2019a). *WeChat* and *Alipay* are considered to be the world's leading mobile payment service players with 600 million and 400 million users respectively (Statista, 2019b). Similarly in Africa, *M-Pesa* in Kenya is regarded as the first known mobile payment service. This payment service enables individuals to send or receive money as well as pay utility bills at their convenience without necessarily having a bank account (Rao, 2012). In Ghana, the mobile payment service sector is similarly experiencing tremendous growth. This is clear from the high rise in the volume of mobile payment transactions in Ghana from about 550 million in 2016 to about 1.5 billion in 2018 (Bank of Ghana, 2019). The surge in adoption of this service has been primarily attributed to the proliferation of mobile telephone coverage, which went from 1 billion users in 2000 to about 6 billion in 2015 (GMSA, 2015).

Despite the huge potential of mobile payments, literature reviewed indicates that the focus of extant research has largely been placed with initial adoption and use of this service. Post-adoption studies on mobile payments have seldom been carried out. In addition, previous studies on initial adoption have largely focused on the functional benefits derived from mobile payments and how it influences the adoption and use of this service. For these studies, mobile payment is a service that adds functional value (eg. Utilitarian) to its users (Chang *et al.*, 2016; Ozturk, Bilgihan, Salehi-

Esfahani, and Hua, 2017), rather than a non-functional one (eg. Hedonic). This study, therefore, seeks to fill this gap. To do this, the study leans on the foundations of the Uses and Gratifications Theory (Katz, Blumler, and Gurevitch, 1974) to identify and examine the gratifications driving the attitude and continuance use of mobile payments in Ghana.

1.2 Research Problem

Mobile payment is gradually changing the payment service sector and transforming the way traditional banking is being carried out (Yonghee *et al.*, 2016). This type of payment service brings banking to the doorstep of customers by ensuring that they can access their cash and transact business from any part of the world at their own convenience (Kang, 2018). However, despite the numerous benefits this disruptive technology brings, there exists a dearth of literature on this disruptive technology (Puschmann, 2017). Extant research on mobile payment has largely focused on initial adoption and use of mobile payments (Chang *et al.*, 2016; Ozturk *et al.*, 2017; Yonghee *et al.*, 2016). There exists a dearth of research on post-adoption studies of mobile payment (Zhou, 2014). In addition, previous studies on initial adoption have largely focused on the functional benefits users derive from mobile payments and how it affects their adoption patterns. For these studies, mobile payment is a service that adds functional value to its users (Chang *et al.*, 2016; Ozturk *et al.*, 2017) rather than a non-functional one. That is, findings from these studies reveal that several functional benefits (eg. Utilitarian) influence individuals' adoption and use of mobile payments. Although the contributions of these studies to the field of knowledge cannot be underplayed, it is imperative for researchers to examine how both functional and non-functional benefits (eg. hedonic, integrative) influence individuals' use of mobile payments.

In addition, literature reviewed on mobile payments revealed limited studies been conducted in the developing country context especially in Sub-Saharan Africa. Considerable research on mobile payments has concentrated on the developed world (Chang *et al.*, 2016; Ozturk *et al.*, 2017; Yonghee *et al.*, 2016) where attributes such as technological infrastructure, legislation, culture, and literacy levels differ from developing countries (eg. Ghana). Hence, the findings from these studies cannot be generalized to the developing country context. Therefore, there is a need for future studies to be carried out in developing countries. In addition, due to the substantial number of studies carried out in the developed world, there exists a dominance of literature over the developed world.

Lastly, studies focusing on the initial adoption of mobile payments have mostly adopted theories that include the Technology Acceptance Model (TAM) (Bailey, Pentina, Mishra, and Ben Mimoun, 2017; de Luna, Liébana-Cabanillas, Sánchez-Fernández, and Muñoz-Leiva, 2018; Mun, Khalid, and Nadarajah, 2017), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Abrahão, Moriguchi, and Andrade, 2016; Oliveira, Thomas, Baptista, and Campos, 2016). Though the relevance of these theories in Information Systems (IS) domain cannot be underplayed, some researchers have criticized these theories (eg. TAM) for not being able to appropriately explain user's behavior (Hai and Kazmi, 2015; Lim, Osman, Salahuddin, Romle, and Abdullah, 2016). For instance, Bagozzi (2007) argued that TAM is not an appropriate model to investigate and explain usage behavior because perceived ease of use and perceived usefulness might not examine user behavior properly. Therefore, the researcher proposes more convincing theories should be considered.

Reviewed literature in the field of mobile payment research suggests that this service is a rapidly growing disruptive technology that is gaining attention in the field of IS. Therefore, a call exists for future studies to be carried out in this area as more gaps remain unanswered especially in the developing world. Hence, this study leans on the foundations of the Uses and Gratifications Theory to identify and examine the gratifications (i.e., both the functional and non-functional) driving the attitude and continuance use of mobile payments in Ghana.

1.3 Research Purpose

With reference to the gaps identified in literature regarding the determinants/adoption and use of mobile payments, this study aims to identify and examine the effect of gratifications on user attitude and continuance use of mobile payments in Ghana.

1.4 Research Objectives

The following objectives are formulated to guide the study:

- a. To investigate the nature of mobile payments in Ghana
- b. To investigate user gratifications on the use of mobile payment.
- c. To examine the effect of gratifications on user attitude towards mobile payment and continuance use intention

1.5 Research Questions

The thesis considers the following questions to accomplish the research objectives and answer the research problem

RQ1. What is the nature of mobile payments in Ghana?

RQ2. What are the gratifications obtained from mobile payment use?

RQ3. What are the effects of gratifications obtained on attitude towards mobile payment use and subsequently continuance use intention?

1.6 Significance of Research

There are three ways to communicate the significance of this study. That is research, practice, and policy. With respect to research, this study was carried out to investigate the effect of gratification on attitude and continuous use of mobile payments in a developing country context (i.e., Ghana). This has largely been ignored by previous research. Similarly, the moderating effect of variables such as *income* and *education* on the relationship between gratifications obtained and use intention has largely been ignored by previous research. Arguably, this is the first study carried out on gratifications and continuous use of mobile payments. This study, therefore, adds to the limited literature in this area of mobile payment research.

To practice, the findings show that Integrative gratification, Ease of use gratification, and Usefulness gratification significantly influence users' attitudes towards mobile payment use. As a result, mobile payment service providers need to ensure that services provided continuously enable users to enjoy these forms of gratification (that is, Integrative gratification, Ease of use gratification and Usefulness gratification). That is, when they enjoy these gratifications, they intend to patronize mobile payment services more. Similarly, results indicate that Hedonic, Convenience, and Cognitive gratifications did not influence users' attitudes towards mobile payment use. Therefore, this study admonishes mobile payment service providers to integrate mobile payment with the features of these gratifications so that individuals can enjoy them.

To policy, creating a favorable ICT environment will positively influence users to adopt and use mobile payment services. An enabling ICT environment in the form of ICT access and infrastructure will equip individuals with the necessary tools to conduct mobile payment transactions. Similarly, an enabling environment in the form of ICT legislation and policy will ensure that users' financial information is protected and secured. Thus, this study will provide policymakers, especially the financial sectors, a clear insight into the gratification effect on their customers towards mobile payment services.

1.7 Chapter Outline

The thesis has seven chapters. Aside this chapter, the remainder of the chapters is described as follows:

Chapter two contains the review of FinTech literature, FinTech innovations, Mobile Payments, Issues and Evidence in mobile payment research, Conceptual Approaches to Mobile Payment adoption and use, Geographical Issues in Mobile Payment Research, and Research Gaps and Future Research Directions.

Chapter three provides a justification for the model relied on for this study based on literature reviewed.

Chapter four tackles the methodology adopted in this study. It presents a series of steps which include research paradigm, research methods, and the method of data analysis.

Chapter five tackles the findings and analysis of the study. First, the demographic characteristics of the individuals relied on for this study are presented. In addition, an assessment of the measurement model for indicator reliability, internal consistency for reliability, convergent validity, and discriminant validity by ensuring the application of the standard decision rules is followed. Furthermore, a structural model assessment is undertaken to show the Multicollinearity Statistics, Hypothesis Testing: Bootstrapping Direct Effect Results, and the assessment of the goodness of fit. Finally, an assessment is undertaken to examine the influence of moderators that includes income and education on the relationship between the independent constructs and the dependent construct.

Chapter six discusses the results obtained from the analysis of the findings. These discussions are based on the relationship that exists between the endogenous and exogenous variables of the model followed by discussions to check the effect of moderators such as education and income on the exogenous variables.

Chapter seven is the concluding chapter, which summarizes the purpose and objectives of the study, the major findings, and conclusions. It also communicates the implications of the study conducted as well as the directions for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

As discussed in Chapter One, the objective of this study is to identify and examine the gratifications driving the attitude and continuous use of mobile payments in Ghana. This chapter is carried out in five parts. The first part contains a review of relevant literature on FinTech, that is, an overview, definition of concepts, FinTech ecosystem, and FinTech innovations. The second part contains a review on Mobile Payments (i.e., definition, nature of mobile payments in Ghana, classification of mobile payments, trends of recent mobile payments, mobile payment requirements, and the security challenges for mobile payment). The third part further reviewed literature on mobile payments in order to highlight research issues and areas. The fourth part focused on a review of the conceptual and methodological approaches relied on by previous researchers. The final part identified gaps inherent in the review of issues, methods, and frameworks in order to argue for a need to undertake this study.

2.2 Financial Technology Evolution

Financial Technology (FinTech), a relatively new concept, can be traced back to the 19th century with the introduction of the telegraph in the year 1838 and after the manufacture or construction of the first and earliest transatlantic cable in the 1800s (Douglas *et al.* 2015; as cited in Nicoletti, 2019). Together, these two technological innovations formed the basis of the late 1800's financial globalization. Prior to the end of the 1900s, the financial services industry was regarded as an industry that heavily depended on analog technologies.

The early part of 1990 saw the financial service industries gradually moving from analog to digital technologies (Nicoletti, 2019). This was manifested with the introduction of the Automated Teller Machine (ATM). The ATM has been regarded as one of the enormous FinTech innovations of the last century as it marked the beginning of the FinTech era (Nicoletti, 2019). It was the first innovation that demonstrated the interconnection between finance and technology as well as opened the door to digitalization in the financial services industry in the 1990s. Additionally, the launch of the World Wide Web (WWW) and the first internet banking experiments from ING in Europe and Fargo in the United States (US) and the replacement of telegraph by fax and later instant messaging (IM) marked this decade (Nicoletti, 2019).

In this present era -the 21st century- the financial services sector has been digitized. The traditional financial services industry has massively invested in ICTs to better the delivery of financial services to individuals as they face extreme competition from FinTech startups (Nicoletti, 2019). The invention of mobile devices in this era has changed the way individuals undertake financial transactions. In some parts of the world, mobile devices have enabled individuals to have a bank account. With a click or tap on their mobile devices, users can undertake financial transactions from anywhere and at their own convenience (Nicoletti, 2019; Yonghee *et al.*, 2016).

FinTech initiatives are growing rapidly and affecting diverse branches and areas in the financial services space. For example, the introduction of Bitcoin by Satoshi Nakamoto in the year 2008, a centralized digital currency, that can be transferred from one person to another without a financial institution is a FinTech initiative that is disrupting the way financial services is being carried out (Corbet, Lucey, Urquhart, and Yarovaya, 2019). Furthermore, the introduction of peer-to-peer

loans, artificial intelligence and machine learning, new consulting and trading systems, and equity crowdfunding (Philippon, 2016; Puschmann, 2017) are disrupting the delivery of financial services around the globe.

In recent times, the scope of FinTech has changed as it does not only identify a specific entity or initiative, but also includes startups that utilize technology in disrupting the traditional financial service industry. As a result, the term FinTech has expanded to include;

- a. Startups offering financial services to individuals
- b. The alliance of startups and traditional firms which are either financial institutions or technology companies.
- c. Financial institutions adopting advanced financial technologies to deliver services to customers (Nicoletti, 2019).

2.3 Financial Technology Defined

The financial technology (FinTech) sector is growing very fast and has received a lot of attention from academic scholars. These scholars have offered several definitions of the term. Even though some common definitions have been attributed to the term, its scope has still not been clearly defined (Dávid Varga, 2017; Schueffel, 2018). An argument that continues to exist is whether all new emerging technology-based financial institutions should be termed as FinTech or if traditional financial institutions can also be termed as FinTech when they introduce new technologies to better services given to customers. In addition, there exists no clarity about a market capitalization threshold that may be adopted to help distinguish FinTech companies from traditional financial intermediaries (Dávid Varga, 2017). Regardless of the differences that exist, scholars agree that

FinTech uses modern technology to deliver better financial services to customers. Table 2.1 includes a description of some of FinTech's academic concepts.

Table 2.1 Scholarly definitions of FinTech

Definition	Source
FinTech refers to the modern financial services industry and the future of financial services such as mobile banking, blockchain technology, and internet banking.	Wonglimpiyarat (2017)
“Computer programs and other technologies used to support or enable banking and financial services”.	Oxford English Dictionary (2016)
“Financial technology or FinTech is an economic industry composed of companies that use technology to make financial services more efficient”.	Wikipedia (2016)
FinTech refers to an economic industry that is made up of companies that adopt and use technological innovations to deliver better financial services to customers whilst achieving efficiency.	McAuley (2014)
FinTech refers to the situation where non-financial firms use technology innovations to better deliver financial services such as payments, remittances, and investment.	Yonghee <i>et al.</i> (2016)
FinTech refers to businesses that provide financial services to their customers by relying on the use of modern technology.	FinTech Weekly (2016)
FinTech refers to organizations that combine innovative business models and technology to help promote and disrupt the delivery of financial technology,	Ernst and Young (2016)
FinTech can be defined as all financial solutions that are capable of technology. FinTech is not only linked to specific sectors or business models but also extends to products and services traditionally provided by the financial services industry.	Arner, Barberis, and Buckley (2015)
FinTech includes P2P lending, third party payments, risk management, and insurance products.	Shim and Shin (2016)
An economic industry made up of companies that adopt and use technology in other to make financial services more efficient.	Čížinská, Krabec, and Venegas (2016).
Financial technology refers to fully or non-regulated companies whose aim is to create novel, technology innovated financial services with a value-added design in other to change present financial practices.	Dávid Varga (2017)

Source: Author's construction

From Table 2.1, it can be seen that Čižinská, Krabec, and Venegas, (2016), McAuley (2014), and Investopedia share the same view or opinion on the definition of FinTech. To them, FinTech is an “economic industry” and this economic industry constitutes companies or businesses that rely upon or adopt technological innovations in order to deliver efficient financial services to their customers. These authors argue that the term FinTech is mainly used or adopted by profit-making financial institutions or companies that want to provide their customers with better financial services in order to gain more profits and benefit from some form of competitive advantage.

Ernst and Young (2016), an advisory company with several branches around the globe, view FinTech as all companies or organizations, including traditional banks, telecommunication companies among others that can develop innovative business models with the aid of technology. Their definition serves as a value-added approach to other definitions of the term FinTech as it relates to business models used in FinTech. The definition of Arner, Barberis, and Buckley (2015) expands that of Ernst and Young by emphasizing that, FinTech is not only limited to, business models but also includes extending products and services traditionally delivered by the companies in the financial services industry. That is, FinTech broadens the scope of financial service delivery, which the traditional financial services industry could not do.

FinTech weekly (2016), *a media outlet*, and Yonghee, Young-Ju, Jeongil, and Jiyoung (2016) share similar perspectives on FinTech. Whilst FinTech weekly (2016) view FinTech as businesses that provide financial services to customers by relying on the use of modern technology, Yonghee, Young-Ju, Jeongil, and Jiyoung (2016) define FinTech as a situation where non-financial firms use technology innovations to deliver financial services such as payment, remittance, and

investment. All definitions presented in Table 2.1 agree to one special feature of FinTech, which is, a newly emerging sector has no boundary.

This study, however, adopts the definition of McAuley (2014) who referred to FinTech as an economic industry made up of companies that use technology to deliver better financial services to customers whilst achieving efficiency. The study leans on this definition because the focus of this study is not only limited to FinTech companies that adopt modern technology to disrupt the delivery of financial services, but also the financial service companies that have adopted modern technology to better the delivery of financial services to their customers.

2.4 FinTech Ecosystem

According to Moore (2006, p.33), one of the founding fathers of Financial technology ecosystems, referred the FinTech ecosystem to “an international community of economic actors whose individual business activities share in some large measure the fate of the whole community.” Therefore, FinTech’s ability to create value critically lies in the accessibility, advance, and development of vital components of its ecosystem (Adner and Kapoor, 2016), such as consumers, services, regulations, and technology suppliers (Zalan and Toufaily, 2017). In other words, to gain a better understanding of FinTech's competitive and collaborative dynamics, its ecosystem needs to be analyzed. An unchanging and dependent ecosystem is fundamental to the growth of the FinTech industry (Lee and Shin, 2018). The FinTech ecosystem is made up of five (5) components, according to (Lee and Shin, 2018). These are FinTech startups (that is, payment, lending, crowdfunding, wealth management, and insurance FinTech companies), Technology developers (that is, cryptocurrency, cloud computing, social media developers, etc.), Customers

(that is, individuals and firms), Traditional financial institutions (that is, traditional banks, insurance companies, etc.) and the Government (that is, financial regulators).

The cooperation of all parties within this ecosystem serves as an essential element in promoting quality service delivery (Apanasevic, 2013). Therefore, all parties within the FinTech ecosystem are required to work together in order to ensure effective and efficient delivery of financial service to customers. Figure 2.1 presents the FinTech ecosystem.

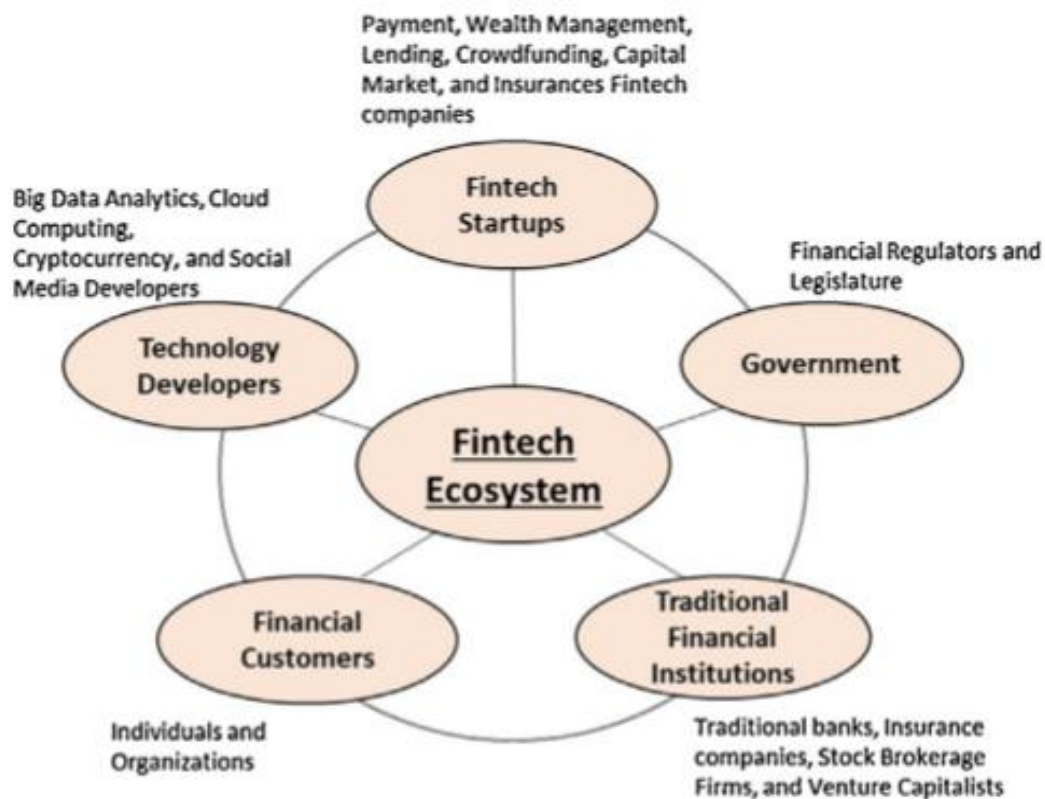


Figure 2. 1 FinTech Ecosystem (Adopted from Lee and Shin, 2018)

Table 2. 1. Roles of the various elements in the FinTech ecosystem

Elements	Roles
FinTech startups	1. Provides personalized services at lower costs whilst targeting niche markets.
Technology developers	1. Creates a friendly environment for FinTech startups to introduce their innovative services. 2. It also provides digital platforms mobile services, smartphones, among others.
Financial Customers	1. Provides revenue to FinTech companies 2. Demand financial services form FinTech companies
Traditional financial companies	1. Provides consumers with a wide variety of financial products and services.
Government	1. Provides a favorable regulatory environment for FinTech

Source: Lee and Shin, (2018); Yang (2015); Holland FinTech (2015)

2.5 Financial Technology Innovations

Due to the current developments in Information Technology (IT), digitalization in the form of FinTech has resulted in increased automation of business processes as well as reorganizing the business models of the financial services industry (Puschmann, 2017). FinTech disrupts the business models of financial services firms by changing the way in which existing financial services firms create and deliver financial services, allowing new entries for entrepreneurship, creating significant convenience and privacy while creating challenges for law enforcement (Philippon, 2016). Examples of innovations that are key to FinTech are cryptocurrencies and blockchain, artificial intelligence and machine learning, peer to peer lending, new advisory and trading systems and equity crowdfunding and mobile payment (Philippon, 2016; Puschmann, 2017).

2.5.1 Cryptocurrencies and Blockchain

Cryptocurrencies “are peer-to-peer electronic cash systems which allow online payments to be sent directly from one party to another without going through a financial institution” (Corbet *et al.*, 2019, p.1). Unlike other financial assets, cryptocurrencies have no regulator or authority that sets the rules. They are not backed or regulated by any central bank in the world. Out of free market and digital technologies, cryptocurrencies have been developed (Leblanc, 2016). Bitcoin proposed as the first decentralized digital currency by Satoshi Nakamoto in 2008 remains the world's leading cryptocurrency market leader (Corbet *et al.*, 2019; PwC, 2016). Between the period of October 2016 to October 2017, bitcoin's market capitalization saw a rise from around \$10 to \$79 billion, while there was a price increase from \$616 to \$4,800 within the same span. In December 2017, the price of Bitcoin saw a huge increase to \$19,500 (Corbet *et al.*, 2019).

According to PwC (2016, p.16), Blockchain is “a new technology that combines a number of mathematical, cryptographic, and economic principles in order to maintain a database between multiple participants without the need for any third-party validator or reconciliation”. Blockchain is the technology that ensures the existence of cryptocurrencies (PwC, 2017). Blockchain technology is increasingly becoming relevant as it constitutes the next big thing in business process optimization technology, similar to how Enterprise Resource Planning (ERP) enables businesses to optimize their business processes by sharing business data, blockchain will allow businesses to optimize their operations by further facilitating data sharing between businesses that have different goals and objectives (PWC, 2016).

2.5.2 Artificial Intelligence and Machine Learning

Artificial Intelligence (AI) is a union term for a number of technologies such as Machine Learning and Natural Language Processing that can be combined within a cloud-based environment to store and process large amounts of data and to undertake advanced tasks without human assistance (Frith, 2019). Machine Learning uses statistics to find patterns in data that can be used to make predictions (Kolog et al., 2020) whilst Natural Language Processing concerns the association between computers and human languages. The primary aim of Natural Language Processing is to read, decode, understand, and make meaning of the human language so that it gives a worthwhile output (Frith, 2019; Kolog, 2017). With the help of AI, traditional financial institutions and FinTech companies are able to extract large amounts of customer data and analyze this data so as to gain more insights about how to serve customers better (PwC, 2016).

2.5.3 Peer to Peer Lending

With the increasing popularity of online communities in the past decade, a new way of borrowing funds has found its way into the credit market - Online Peer-to-Peer (P2P) Lending (Bachmann and Funk, 2011). P2P lending shifts the old idea of personal credit into the World Wide Web. With this type of lending model, the mediation role of financial institutions is not required (Herzenstein and Andrews, 2008). P2P Lending communities allow individuals to borrow money from and to one another directly without the need for a financial institution (Bachmann and Funk, 2011; Herzenstein and Andrews, 2008). With P2P Lending, the decision process of loan origination is put in the hands of private lenders and borrowers. In addition, websites such as Prosper.com offer a platform where borrowers and lenders engage with one another (Bachmann and Funk, 2011). Borrowers describe the reasons behind their loan requests and provide vital information

concerning their current financial standings (eg. income). Lenders have the chance to give a loan with an interest rate derived from the borrower's information (Bachmann and Funk, 2011). For borrowers, online P2P offers the chance to obtain a loan from an individual without the presence of any financial institution involved in the decision process. For Lenders, online P2P can be viewed as an investment model where high investment returns can be realized as well as high investment risks (Bachmann and Funk, 2011).

2.5.4 Equity Crowdfunding

According to Ahlers, Cumming, Günther, and Schweizer (2015, p. 955), equity crowdfunding is “a form of financing in which entrepreneurs make an open call to sell a specified amount of equity or bond-like shares in a company on the Internet, hoping to attract a large group of investors”. This call by entrepreneurs seeking investors is made on various online crowdfunding platforms such as *Crowdcube*. In making a call, entrepreneurs ensure they put out detailed information about what they intend to sell. This is because, interested investors make decisions based on the information provided by entrepreneurs (Belleflamm, Lambert, and Schwienbacher, 2013). If investors buy the equity of a company, and the company succeeds, it leads to an increase in the value of the company and, thereby, increasing the value of the share of investors in that business. Similarly, if the business fails, investors lose their investment. The equity crowdfunding market, however, is significantly influenced by its home country's legislative climate (Ahlers *et al.*, 2015). Furthermore, as equity crowdfunding involves securities sales (Bradford, 2012), and is therefore subject to some regulatory issues, it has been restricted in some countries around the globe (Ahlers *et al.*, 2015).

2.5.5 Mobile Payments Services

Mobile payments have received a good deal of definitions from various scholars in the field of IS. However, the term mobile payment and mobile banking have been used interchangeably. Nevertheless, they are not the same and there is a need to distinguish them. Mobile payments relate to universal and generic services that can be carried out by service providers or financial institutions. Whilst Mobile banking is narrower in scope as it relates to the bank procedures. That is, mobile banking is considered as a subset of mobile payments (Iman, 2018). This distinguishing therefore sets the foundation to focus and define mobile payments in this study.

Liébana-Cabanillas (2012), defines mobile payments as any business activity involving the use of an electronic device connected to a mobile network and helping to carry out a transaction. This definition is not different from that of (Dahlberg, Mallat, Ondrus, and Zmijewska, 2008) who described mobile payments as a method of payment for initiating, approving, and conducting a transaction using mobile devices. These two definitions share similar views on mobile payments. The authors agree that, for mobile payments to happen, mobile or electronic devices are necessary. Mobile payments consist of a quick, fast and convenient way of completing transactions between two or more parties using a mobile device (Liébana-Cabanillas, Sánchez-Fernández, and Muñoz-Leiva, 2014). In this study, the definition of Liébana-Cabanillas *et al.* (2014) was used primarily because mobile payments are viewed as involving two or more parties that aim to complete a transaction in a simple and fast way using a mobile device whilst enjoying the convenience in doing so.

The mobile payment market has been regarded as the fastest growing FinTech services sector as it enables the easy transfer of cash from one person to another at anywhere and anytime (Yonghee *et al.*, 2016). The growth of the global mobile payment market has been attributed to mobile devices being increasingly adopted. According to the GSMA Intelligence (2017) report, mobile phone subscribers in the year 2017 stood at about 5 billion with a penetration rate of 67%. This number is, however, predicted to increase to about 5.7 billion in the year 2020 with a penetration rate of 72%. Additionally, Sub Saharan Africa is regarded as the third growing region in the world in terms of mobile phone subscriptions. At the end of 2018, the region recorded 456 million unique mobile subscribers. An increase of 20 million over the previous year and representing a penetration rate of 44% (GSMA, 2019).

2.6 Nature of Mobile Payments Services in Ghana

In Ghana, mobile payment services which include *Mobile Money (MoMo)*, *Mobile Banking*, and *Internet banking* have gone a long way to reshape the delivery of payment services in the financial services industry (Bank of Ghana, 2018). These services provide easy banking solutions to customers within the country. Unlike traditional financial services, individuals registered on any of MoMo, Mobile banking, and Internet banking can have access to their cash at anytime and anywhere in order to undertake transactions (Bank of Ghana, 2018).

According to (GSMA, 2013), MoMo is described as a transformation service that uses ICT and other non-bank retail channels to extend the distribution of financial services to individuals who cannot be reached via traditional branch-based financial services. MoMo services consist of

electronic wallets used to carry out peer-to-peer (P2P) transfers, receive salaries, or make government payments to individuals (G2P) (GSMA, 2013).

The importance of the MoMo industry cannot be downplayed as it has created several job opportunities for MoMo agents, FinTech companies, service providers, retailers, and merchants. Currently, there are three main MoMo service providers in Ghana which are all telecommunication companies: *MTN Mobile Money*, *Vodafone Cash*, and *AirtelTigo Cash*. These service providers provide the platform for their subscribers to register and undertake MoMo transactions at their own convenience. Subscribers are required to dial an Unstructured Supplementary Service Data (USSD) code to begin a transaction. Transactions are verified and approved by the user through a unique Personal Identification Number (PIN) which is only known to the user. MoMo providers also operate an interoperability account that allows users to transfer cash between a customer account held with another MoMo provider and other players in the financial system. Tanzania was the first in Africa to implement this in 2014. Ghana, Nigeria, Rwanda, and Kenya have followed suit with the launch of interoperability projects and use cases (GSMA, 2019). This integration of MoMo providers and banks is a use case that has increased volumes between MoMo and banking systems (GSMA, 2019).

The total value of MoMo transactions saw tremendous growth from GHc155.84 billion in 2017 to GHc 223.21 billion. This also saw the total float balance growth by 13.5% to Ghc 2.63 billion. An increase in MoMo transactions is as a result of the increasing number of individuals who register to have MoMo accounts. The total number of registered MoMo accounts in Ghana at the end of December 2018 stood at approximately 32 million compared to the figure of approximately 23

million in 2017. In addition, the number of active registered accounts increased from about 11 million in the year 2017 to about 13 million in the year 2018 (Bank of Ghana, 2018). Table 2.3 shows the growth in MoMo accounts, volume, and value in transactions for a period of 2015-2018.

Table 2. 2. Mobile Money Services

Indicators	2015	2016	2017	2018
Total number of registered mobile money accounts	13,120,367	19,735,098	23,947,437	32,554,346
Active mobile money accounts	4,868,569	8,313,283	11,119,376	13,056,978
Total volume of transactions	266,246,537	550,218,427	981,564,563	1,454,470,801
Total value of transactions (GH¢'million)	35,444.38	78,508.90	155,844.84	223,207.23

Source: Bank of Ghana Annual Report (2018)

Mobile Banking has been seen as a popular framework with the advent of mobile technology and phones as it blends qualities such as ease, ubiquity, and interactivity (Turban, King, Viehland, and Lee, 2006). In this present day, individuals are able to undertake banking services at their own convenience and connect to easily and quickly to these services using their mobile devices (Gu, Lee, and Suh, 2009).

The First National Bank (FNB) and the Ghana Commercial Bank were the first banks in Ghana to be given permission to roll out mobile banking solutions (Bank of Ghana, 2018). With Mobile banking, users are able to monitor their accounts in real-time and enhanced security is provided for all transactions through the use of a PIN. Users are required to input their PIN to verify a transaction after the bank's required USSD code is dialed. In order for individuals to enjoy this

service, they must be clients who hold accounts with a specific bank that operates Mobile Banking services.

Mobile Banking has experienced rapid growth since its launch in the Ghanaian financial services sector, largely due to the convenience it provides users, which is evident in the growing number of people who sign up for the service. For example, the total number of registered mobile banking customers increased from about 2.2 million in 2017 to about 3.9 million in 2018. Similarly, the value of mobile banking transactions within this period increased from about GHc 1.5 billion to GHc 5.6 billion respectively. Table 2.4 indicates the growth of mobile banking in Ghana in terms of users, volume, and value of transactions in Ghana from the year 2015 to 2018.

Table 2. 3 Mobile banking

Indicators	2015	2016	2017	2018
Number of registered customers	1,449,374	2,175,644	2,110,984	3,891,269
Volume of transactions	5,440,387	6,821,838	7,036,285	14,805,878
Value of transactions (GHc)	178,588,021	357,383,111	1,501,372,536	5,658,399,344
Average volume of transactions per day	29,729	18,639	19,277	40,564

Source: Bank of Ghana Annual Report (2018)

Internet Banking is considered to be an automated system that provides versatile, easy, and affordable channels to customers with integrated online banking services. It includes online account checks and deposits, insurance, household loans and other financial services (Bhattacharjee, 2001). Using internet banking, a bank's customers can make the same banking transactions as a brick and mortar branch at their own convenience via the internet (Chen, Hsiao, and Hwang, 2012).

However, unlike MoMo and Mobile banking in Ghana, Internet Banking has in recent times experienced a decrease in the number of registered customers and the value of transactions. In the year 2018, the number of registered internet banking users decreased to 815, 904 from 962, 487 in the year 2016 (Bank of Ghana, 2018). Similarly, the value of internet banking transactions has seen a decrease from approximately GHc 9. 7 billion in 2017 to GHc 6.2 billion in 2018. The sudden decrease in these figures can be attributed to the costly nature of internet services in the country. In addition, MoMo and mobile banking provide access to financial services for individuals in deprived areas within the county. With MoMo and mobile banking, individuals require no internet access to undertake financial transactions (Bank of Ghana, 2018). Table 2.5 gives a summary of internet banking in Ghana.

Table 2. 4 Internet Banking

Indicators	2015	2016	2017	2018
Number of registered customers	840,532	962,487	936,965	815,904
Volume of transactions	999,439	2,705,191	2,437,785	3,205,878
Value of transactions (GHc)	2,286,702,322	6,779,205,499	9,739,336,941	6,267,223,830
Average volume of transactions per day	5,461	7,391	6,679	8,783

Source: Bank of Ghana Annual Report (2018)

2.7 Classification of Mobile Payment

Four (4) classes of mobile payment service providers can be listed (Kang, 2018). They are Hardware makers, Operating system makers, Platform providers, and financial institutions.

2.7.1 Hardware Makers

Hardware makers payment-based services are reliant on hardware makers and operate only on mobile devices that are developed by corresponding hardware makers. Due to its reliance on hardware, it improves security by ensuring that users are authenticated either through fingerprint or iris recognition. As such, user financial information in the form of a hardware module is stored securely within mobile devices and helps payment by connecting traditional financial institution systems with software (Kang, 2018).

2.7.2 Operating System Makers

Unlike hardware makers, payment-based services from operating system makers depend on operating system makers and operate on mobile devices that have operating system makers built on. Like hardware manufacturers, operating system manufacturers are also connected or linked to traditional financial institution systems and users make payments via mobile apps, the internet, or Near Field Communication (NFC). Financial user information is stored securely on the mobile device hardware module and user authentication is performed by biometric authentication (Kang, 2018).

2.7.3 Platform Service Providers

Platform service providers provide digital platforms for smartphones, mobile services, among others (Lee and Shin, 2018). They also provide payment-based services on their products and services. Unlike payment-based services by hardware and operating system manufacturers, platform service providers do not produce mobile devices and operating system is not produced by them, but based on certain mobile devices and operating system environment and given that the

specifications of each mobile device and operating system manufacturer are met, mobile payment services are available. (Kang, 2018). That is, platform service providers provide that platform where payment can be made by mobile devices when certain requirements are met.

2.7.4 Financial Institutions

Financial institutions are institutions that provide comprehensive financial products and services to customers (Holland FinTech, 2015). Financial institution-based mobile payments are payments made through financial institutions using Information Technology. Similar to platform-based payments, financial institutions do not develop mobile devices or operating systems, but only provide an avenue for payment to be made when certain conditions of mobile devices and operating system makers are met. However, due to its reliance on financial institutions, users can make payments through their accounts and cards of the appropriate financial institution (Kang, 2018).

2.8 Trends of Mobile Payments

Mobile devices have created tremendous financial growth and inclusion opportunities and are expected to become a common tool for various financial transactions (Iman, 2018). Hundreds of mobile payment services have been brought in across the globe to provide better financial services to customers (Iman, 2018; Kang, 2018). Table 2.6 gives a summary of recent global mobile payment service trends.

Table 2. 5 Mobile payment services trends.

Mobile payment	Description
Apple pay	A mobile payment system which relies on the manufacturer of both Hardware and Operating System. Only Apple devices use this payment service. Apple pay enables users to make transactions by encrypting one-time token data that is not revealed publicly and by promoting a separate Secure Element (SE) that stores sensitive information. In addition, this payment service demands user authentication which is done through a fingerprint or password during payment. Using Apple pay, users can make payments from their apple devices at their own convenience.
Samsung pay	Just like Apple Pay, Samsung pay similarly allows individuals to make transactions by communicating with many financial institutions worldwide. It is a hardware maker-based payment service that is compatible with the latest Samsung phones which runs on android OS. User authentication is done through fingerprint and eye retina.
Alipay	Alipay can be used regardless of hardware or operating system maker, unlike both Samsung and Apple pay. Introduced by Alibaba regardless of the mobile device or operating system, Alipay adopts a unique barcode that is created on a mobile device screen when the user is authenticated so that payment information sent to the mobile device is approved when the cashier scans the code.
LG pay	LG Pay is a payment service for hardware manufacturers that can only be used on LG G6 phones running on android operating systems. This service is available only in Korea, enabling users to make transactions by connecting to different financial institutions. It also accepts fingerprints and authentication passwords.
Android pay	Android pay is an operating system maker mobile payment service that allows users with mobile devices running on android 4.4 <i>Kitkat</i> or above to make payment form the android pay app at their own convenience. Similar to Samsung and Apple pay, payment using this app is made only through NFC and user authentication is made through passwords or fingerprints.

Source: (Kang, 2018; Son, Lee, Kim, and Kim, 2015; Xia and Hou, 2016)

2.9 Mobile Payment Requirements in FinTech Space

The rapid growth of FinTech has led to the introduction of various forms of mobile payment services. These mobile payment services are capable of delivering services in forms such as hardware and operating system makers, payment platform providers, and financial institution

based providers (Kang, 2018). As such, mobile payments in FinTech are required to adhere to the following requirements;

2.9.1 Convenience

Mobile payment services, unlike the traditional payment services, are required to provide customized payment services to meet users' needs whilst ensuring that users can make payment at their own convenience from anywhere on their mobile devices by simply authenticating users through either passwords or biometric authentication (Liébana-Cabanillas, Sánchez-Fernández, and Muñoz-Leiva, 2018; Liébana-Cabanillas, Sánchez-Fernández, and Muñoz-Leiva, 2017; Zhou, 2014).

2.9.2 Mobile Payment Infrastructure

Another requirement of mobile payments is that it should have a mobile payment infrastructure that allows desired services to be paid from mobile devices from one's convenience (Kang, 2018). Though mobile payment offers better convenience as compared to other traditional payment systems, without a payment infrastructure payment services cannot be used or made (Dahlberg *et al.*, 2008).

2.9.3 Security

Mobile payments services store users' account information, and as such, it is very important for this information to be protected from malicious attackers or individuals who are not supposed to have access to confidential information. Therefore, mobile payment services should be secured in terms of both Hardware and software (Isaac and Zeadally, 2014; Y. Yang, Liu, Li, and Yu, 2015).

2.9.4 Compatibility

The compatibility of mobile payment services with other traditional payment services and the financial environment that includes banks is highly required (Tan, Ooi, Chong, and Hew, 2014; Wu, Liu, and Huang, 2017b; Yang and Chang, 2012). If mobile payment services are compatible with traditional payment services and the financial environment, mobile payment, existing payment services, and infrastructure can be utilized and such as there will be no need to replace existing payment systems and infrastructure. In addition, by reducing changes in existing payment services, the cost of implementing new payment infrastructure is reduced (Kang, 2018).

2.10 Mobile Payment Service Security

Even though mobile payment services have several advantages (Kang, 2018; Lema1, 2017; Wu, Liu, and Huang, 2017a), the demerits that comes with its use cannot be ignored (Kang, 2018; Linck, Kathrin, Wiedemann, Dietmar Georg, Pousttch, *et al.*, 2007; Wang *et al.*, 2016). Security challenges of mobile payment services can be classified into mutual authentication, authorization, integrity, availability, privacy, and atomicity (Kang, 2018; Stallings, 2013).

2.10.1 Mutual Authentication

It is necessary to have mutual authentication in mobile payment systems. Mobile payment service providers and existing financial infrastructures must be mutually authenticated (Kang, 2018). The absence of mutual authentication can lead to confidential user information falling into the hands of the wrong people. In addition, malicious attackers can assume the identity of users if mutual authentication absent (Kang, 2018; Wang *et al.*, 2016).

2.10.2 Authorization

Mobile payment services should be assessable to only authorized users. Information exchange for payment should only be accessible to authorized subjects. While participating in the payment process, payment subjects should not be able to view information other than verified information. If payment subjects are not authorized, malicious hackers can easily access the payment information of the user (Kang, 2018).

2.10.3 Integrity

Mobile payment services should satisfy integrity (Kang, 2018; Stallings, 2013). In the situation where payment information traded by mobile devices is altered by external factors, it can have direct harm to the financial resources of the user (Kang, 2018). Mobile payment systems need to prove the integrity of the payment to both the user and the payment service. (Kang, 2018).

2.10.4 Availability

Although mobile payment services allow payment faster, easier, and wider than traditional payment services, they must ensure maximum security relative to other traditional payment services. Mobile payment services must ensure that payment services are made available to individuals 24 hours a day (Kang, 2018). This ensures that users can perform transactions anytime and anywhere (Kang, 2018; Stallings, 2013; Wang *et al.*, 2016).

2.10.5 Privacy

One of the security challenges associated with mobile payment services is privacy (Kang, 2018). Because mobile payments are mostly made through IT companies ' payment services rather than

through a financial institution, a privacy issue arises as user payment information is provided to all payment subjects. This harms the privacy of the user (Kang, 2018). Therefore, user payment information should be encrypted and divided into purpose and sensitivity to prevent other subjects from figuring out payment information (Kang, 2018).

2.10.6 Atomicity

Mobile payment services should either complete a transaction or not at all. Mobile payment service providers must ensure that payment is only made when the payment process is complete from start to finish and that payment has been rendered successfully to the subjects involved in the transaction (Kang, 2018). Issues arise when payment has been halted due to some internal or external factors and subjects are notified or payment.

2.11 Mobile Payment Services Research: Issues and Evidence

Mobile payment has recently received considerable attention from researchers around the globe due to its disrupting nature. Notable studies on mobile payments have been carried out in two broad areas. That is the adoption or determinants and security of mobile payments. Table 2.7 gives a summary of articles reviewed on mobile payment showing the underpinning theory and framework, research method, and setting as well as relevant gaps for future research.

Table 2. 6 Studies on Mobile Payment

Author(s)	Study focus	Underpinning theory and framework	Research method/ setting	Relevant gaps for future research
Literature on adoption and determinants of Mobile Payments				
Chang <i>et al.</i> (2016)	Factors that motivate individuals to adopt FinTech services	Regulatory focus theory (RFT)	Quantitative/ China	Need for future studies to consider both functional and non-functional benefits obtained from mobile payment use and its influence on use intention
Ozturk <i>et al.</i> (2017)	Factors that influence mobile payment acceptance	Valence theory	Quantitative/ United States of America (USA)	Future studies should examine variables such as; hedonic benefits, usefulness the intention to use in different contexts.
Zhou (2014)	Factors influencing the continuance use of mobile payments	Conceptual model	Quantitative/ China	Future studies should focus on examining the effect of variables such as perceived enjoyment and switching cost on the user behaviour of mobile payments. the effect of flow experience (perceived enjoyment, perceived control and concentration), switching cost and perceived risk on use behaviour of mobile payment.
Yonghee <i>et al.</i> (2016)	The Adoption of Mobile Payment Services for “Fintech”	Elaborative Likelihood Model (ELM) and TAM	Quantitative/ Korea	Call for future studies to investigate the effects of moderators such as age, income, etc. on mobile payment use intention.
Susanto, Chang, and Ha (2016)	Determinants of continuance use intention of mobile banking services	Expectation-Confirmation Model (ECM)	Quantitative/ Korea	The need for post-adoption studies on mobile payments.
Liébana-Cabanillas, Marinkovic, Ramos de Luna, and Kalinic (2018)	Determinants of mobile payment acceptance	Technology Acceptance Model (TAM)	Quantitative/ Spain	Future studies should investigate mobile payment use in different contexts with several moderating variables such as; age, gender and experience level.

Oliveira <i>et al.</i> (2016)	Understanding the determinants of customer adoption and intention to recommend mobile payment	Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)	Quantitative/ Portugal	Need for future studies to investigate users' intention to use and recommend mobile payments
Marion (2010)	The Impact of Mobile Payments on the Success and Growth of Micro-Business	TAM	Quantitative/ Kenya	Need for further studies on mobile payment acceptance.
Anthony and Mutalemwa (2014)	Factors influencing the Use of Mobile Payments	TAM	Mixed method/ Tanzania	Need for further studies on mobile payment adoption and use
Fan, Shao, Li, and Huang (2018)	Understanding users' attitude toward mobile payment use	Theory of perceived value	Quantitative/ USA and China	Need for more studies on mobile payment in different contexts
Bailey <i>et al.</i> (2017)	Mobile payment adoption	TAM	Quantitative/ USA	The need for more studies on mobile payment acceptance whilst using moderating variables such as age, gender, income, etc.
Literature on Security of Mobile Payment Services				
Kang (2018)	Mobile payment in Fintech environment	N/A	Qualitative/ N/A	Limited studies that summarize security requirements by analysing mobile payment with existing mobile payment services
Karnouskos, Hondroudaki, Vilmos, and Csik (2004)	Security, Trust, and Privacy in the secure mobile Payment Service	N/A	Qualitative/ N/A	Limited studies on the security requirements of mobile payment systems
Wang <i>et al.</i> (2016)	Mobile payment security, threats, and challenges	N/A	Qualitative/ N/A	Limited studies analysing the threats and challenges that mobile payment poses
Kadhiwal and Zulfiquar (2007)	Mobile payment security measures and standards	N/A	Qualitative N/A	Limited studies on mobile payment security requirements and standards
Feifei (2010)	Security of Mobile payment model	N/A	Mixed method N/A	Need for future research on mobile payment security

Linck, Kathrin, Wiedemann, Dietmar Georg, Pousttchi, <i>et al.</i> (2007)	Security Issues in Mobile payment	N/A	Qualitative N/A	Need for future studies on security issues in mobile payment
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Source; Authors construction

2.11.1 Adoption and Determinants of Mobile Payments

In recent years, there has been an increase in the mobile payment services sector. The rise has been attributed to the growth in smartphone usage around the world. According to GSMA (2017), 4.8 billion people worldwide use mobile phones representing 65% of the world's population in 2016. Research in this field has looked at the factors that enable individuals to embrace and use mobile payment services (Chang *et al.*, 2016; Ozturk *et al.*, 2017; Yonghee *et al.*, 2016). For example, Ozturk *et al.* (2017) conducted a study in the US to examine the factors that influence customers' intention to use near field communication (NFC) based mobile payment technology. Specifically, the study adopted the valence theory to examine the impact of functional benefits (utilitarian value and convenience) and negative valence (perceive risk and privacy concern) on users' intention to use NFC mobile payment technology. Findings from the study revealed that functional benefits and privacy concerns significantly influenced an individual's intention to use NFC mobile payment technology. The authors however advocated the need for future studies to examine potential antecedents such as; hedonic benefits, usefulness, social norms and previous experience on the intention to use in different contexts. Similarly, Chang *et al.* (2016) conducted a study to investigate Chinese consumers' behavior in adopting mobile payment. Relying on RFT, the authors specifically sought to investigate how perceived functional benefits (eg. utilitarian, convenience) and trust affect behavioral intention. Results from their study, however, remain inconclusive and as such the need for future studies to conduct research in this area.

In order to analyze the determinants of mobile payment usage, researchers examined the most important factors affecting the decision of the consumer to use mobile payment. For example, Zhou (2014) conducted a study to investigate the determinants of mobile payment continuance usage by Chinese users. Using a Structural Equation Model (SEM) approach results from the study showed that, performance expectancy, trust in mobile payment and flow (in the form of intrinsic enjoyment) affect continuance usage. Among these determinants, flow exhibited a relatively larger effect on continuance usage. Zhou (2014) however encouraged future studies to examine the effect of flow experience (perceived enjoyment, perceived control and concentration), switching cost and perceived risk on use behavior of mobile payment. In addition, Liébana-Cabanillas *et al.* (2018) carried a study to predict the determinants of Spanish users' mobile payment acceptance. Using SEM and neural network techniques, the study aimed at developing a research model to predict the significant/important factors influencing the user's decision to use mobile payment. Findings from their study revealed that perceived usefulness and perceived security were the two variables influencing the user's decision to use mobile payment. The authors, however, called for future studies on mobile payment use in different contexts with several moderating variables such as age, gender, and experience level. Similarly, Fan *et al.*, (2018) conducted a comparative study to examine the effect of perceived security and trust in determining users' adoption of mobile payment in the USA and China. They adopted a quantitative research methodology whilst relying on the theory of perceived value. Their findings indicated that, perceived security and trust positively affected users' attitudes towards mobile payment use. That is, when users have a higher perception of security and trust, they will develop a positive attitude towards mobile payment use. They similarly found out that, the US and its providers had a higher trust in mobile payment

technology than the Chinese. This is because, the US has a more powerful law system, a stronger economy and a longer life span of companies.

As evident from the above studies on the adoption and use of mobile payments the focus of extant research has mainly been placed with initial adoption and usage of mobile payment services. Post-adoption studies on mobile payments have seldom been carried out. In addition, previous studies on initial adoption have largely focused on how functional benefits derive the adoption and use of mobile payment services. For these studies, mobile payment is a service that adds functional value to its users (Chang *et al.*, 2016; Ozturk *et al.*, 2017) rather than a non-functional one. As a result, future studies can be carried out to examine how both functional and non-functional benefits affect mobile payment use intention.

2.11.2 Security of Mobile Payments

The area of mobile payment security has largely no been explored by researchers. Researchers have called for more studies in the area (Kang, 2018; Wang *et al.*, 2016). Studies in this area have largely focused on mobile payment security threats and the challenges it poses (Kadhiwal and Zulfiquar, 2007; Kang, 2018; Karnouskos *et al.*, 2004; Wang *et al.*, 2016; Linck, Kathrin, Wiedemann, Dietmar Georg, Pousttchi, *et al.*, 2007). For example, Wang *et al.* (2016) conducted a study on mobile payment security, threats and challenges. Findings from their study revealed that mobile payment faces security threats such as malware, data breaches and Secure Socket Locker (SSL) vulnerabilities such as Heart bleed bugs, network sniffing among others. Their study ended by recommending some mobile payment threat remediation's (i.e, upgrade mobile operating

system regularly, use a strong password, etc.) that users of mobile payment systems need to follow in order to protect and secure their data.

Similarly, Linck, Kathrin, Wiedemann, Dietmar Georg, Pousttchi *et al.* (2007) conducted a qualitative study on customers' viewpoints on the security issues inherent in mobile payment systems. Findings from their study were consistent with that of Wang *et al.* (2016) as they similarly identified fraud and authentication as security challenges facing mobile payment systems. In addition, their findings revealed that individuals expect mobile payment systems to meet security objectives such as authentication, authorization, confidentiality, integrity, non-repudiation. Once these objectives are met, customers will develop trust in mobile payment systems, and this intends will lead to the use of the system. Though these studies are relevant to literature, there is a need for future studies to be conducted on the security requirements mobile payment systems must meet. In this computer age, which we live in, individuals find more and different ways to exploit the vulnerabilities of technologies. As a result, future studies can expand the above studies and investigate new security threats and challenges that mobile payment systems face.

2.12 Conceptual Approaches to Mobile Payment Adoption and Use

This chapter expresses the prevailing theoretical approaches adopted in the study of acceptance and use of mobile payment. Studies in this field have adopted TAM to a large extent as their theoretical lens. Others also adopted UTAUT, Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB) and the Diffusion of Innovations Theory. Table 2.7 gives a summary of some literature reviews in this regard.

Table 2. 7. Summary of Conceptual Approaches to Mobile Payment Adoption and Use

Author(s)	Theory	Findings
Shao, Zhang, Li, and Guo(2019)	Trust and DOI theory	Security was revealed to be the most important precedent of trust followed by repudiation of the platform, mobility, and customization. Trust was identified to be positively associated with continuance use intention and negatively associated with perceived risk.
Liébana-Cabanillas <i>et al.</i> (2014)	TAM, TRA, and UTAUT	Findings from this study revealed that a person's adoption and use of mobile payment systems was influenced by the ease of use, usefulness, trust, and risk.
Oliveira <i>et al.</i> (2016)	UTAUT2	Findings revealed that perceived technology, innovativeness, social influence, compatibility, perceive security and performance expectations have significant effects over mobile payment adoption and intention to recommend the technology.
Chuang, Liu, and Kao(2016)	TAM and TRA	It was found out that, perceived usefulness and perceived ease of use both significantly influence attitude to use mobile payment. In addition, attitude towards mobile payment use has a positive significant effect on the intention to use.
Mun <i>et al.</i> (2017)	Extended TAM	Findings showed that perceived usefulness, perceived ease of use, social influence and perceived reputation significantly influence user's adoption of mobile payment systems with perceived usefulness been the strongest determinant.
Kim, Mirusmonov, and Lee (2010)	Extended TAM	Findings suggest that strong determinants of intention to use mobile payment systems are perceived usefulness and perceived ease of use.
Wu <i>et al.</i> (2017a)	Diffusion of Innovations Theory	Findings revealed that the acceptance of mobile payment by a person depends on perceived risk, perceived usefulness, and emotional position.

Source: Author's construction

2.12.1 Technology Acceptance Model

Initially formulated by (Davis, Bagozzi, and Warshaw, 1989), Technology Acceptance Model (TAM) is an adjustment to the TRA in the field of IS research. TAM expects that its constructs, that is, perceived usefulness and perceived ease of use decide an individual's intention to embrace

and use a specific technology. Perceived usefulness is seen to be directed impacted by perceived ease of use. However, researchers have simplified TAM by removing from the current specification the attitude construct found in (Venkatesh, Morris, Davis, and Davis, 2003). In addition, efforts have been made to extend TAM, resulting in the advancement of TAM2 and TAM3. This progress was made possible by the introduction of factors from related models, the introduction of additional factors of belief and, finally, the examination of antecedents and moderators of perceived usefulness and perceived ease of use (Wixom and Todd, 2005). Notwithstanding, substantial studies that have relied on TAM to study the adoption of mobile payments, have used in its extended form by including certain variables or constructs (Bailey *et al.*, 2017; de Luna *et al.*, 2018; Kim *et al.*, 2010; Mun *et al.*, 2017; Schierz, Schilke, and Wirtz, 2010). In addition, some researchers combined TAM with TRA and UTAUT in the investigation of the adoption of mobile payments (Chuang *et al.*, 2016; Liébana-Cabanillas *et al.*, 2014). Be that as it may, TAM has been criticized for not being able to appropriately explain a user's behavior (Hai and Kazmi, 2015; Lim *et al.*, 2016). Lunceford (2009) further argues that the constructs of TAM overlook important issues which include cost and structural imperatives that influence users to adopt a technology.

2.12.2 Diffusion of Innovations Theory

Introduced by (Rogers, 1995), the concept of Innovation Diffusion (DOI) sees innovation as interacting over time and within a specific social context across specific channels. The theory contends that people possess various degrees of readiness to accept or adopt technological innovations and thus it is generally viewed that the proportion of the population adopting innovation is normally distributed over time (Rogers, 1995). Breaking this normal distribution into

portions prompts the separation of five classifications of individual innovativeness (that is, from earliest adopters to latest adopters) namely; innovators, early adopters, early majority, late majority and laggards (Rogers, 1995). In addition, the DOI theory posits that users' adoption of technology is reliant on five (5) key factors, (i.e, compatibility, relative advantage, observability, trialability, and complexity) (Rogers, 1995). These variables are the constructs of the DOI theory. The initial four constructs are seen to positively influence the rate of technology adoption whilst the last construct (i.e, complexity) is seen to negatively influence the rate of technology adoption (Rogers, 1995). The real rate of technology adoption is guided by both the rate at which technology takes off and the pace of later development. Low-cost technologies may have a quick take-off while technologies who have their worth increasing with widespread or broad adoption (network effects) may have quicker late-stage growth (Rogers, 1995; Rogers, 2003).

IS researchers have tried expanding the DOI theory this includes, Moore and Benbasat (1991) who extended the DOI theory by generating eight factors or constructs that influence the adoption of technology innovation. They are voluntariness, visibility, image, ease of use, result demonstrability, trialability, relative advantage, and compatibility. Scales used to operationalize these constructs were additionally validated in their study.

The DOI theory has been adopted and applied by considerable IS researchers to study the adoption of technology innovations across time (Aizstrauta, Ginters, and Eroles, 2015; Bradford and Florin, 2003; Zhang, Yu, Yan, and Spil, 2015). However, extant studies have reliably s found out that, technical complexity, technical compatibility, and relative advantage are preceding occurrences to the adoption of technological innovations (Bradford and Florin, 2003; Zhang *et al.*, 2015).

Similarly, the DOI theory has been applied by previous researchers to study mobile payment adoption (Shao *et al.*, 2019; Wu *et al.*, 2017a). For example, discoveries from the study of Wu *et al.* (2017) revealed that individuals' adoption of mobile payment is dependent on perceived risk, perceived usefulness, and position emotion.

The DOI has however also encountered some criticisms. Due to the fact that more than three thousand articles across several disciplines have published on the DOI theory in theory and with most of them written after (Rogers, 1995) developed the theory, few alterations have made to the theory (Meyers, Sivakumar, and Nakata, 1999). While each study applies the theory in different contexts or ways, this lack of cohesion has made the DOI theory slow and extremely difficult to apply consistently to new issues. (Katz, Levin, and Hamilton, 1963; Meyers *et al.*, 1999).

2.12.3 Unified Theory of Acceptance and Use of Technology

Developed by (Venkatesh *et al.*, 2003), through a review of eight (8) theories that researchers adopted in studying IS usage behavior. The existed theories are TRA, motivational model, TPB, model of PC utilization, TAM, a combined TPB/TAM, DOI theory and social cognitive theory. The Unified Theory of Acceptance and Use of Technology (UTAUT) seeks to explain an individual's intention to use an IS and usage behavior. UTAUT is made up of four (4) constructs. That is *performance expectancy* which is made up of constructs from TAM such as perceived usefulness (Davis, 1989) and extrinsic motivation (Davis *et al.*, 1989) and relative advantage found in the DOI theory (Moore and Benbasat, 1991). *Effort expectancy* which comprises of constructs perceived ease of use (Davis, 1989) derived from TAM and complexity found in the DOI theory (Moore and Benbasat, 1991). *Social influence* comprises of constructs such as subjective norms

found in TAM (Davis, 1989) and image found in the DOI theory (Moore and Benbasat, 1991). Finally, *facilitating conditions* is made up of constructs such as behavioral control Davis (1989) found in TAM and compatibility found in the DOI theory (Moore and Benbasat, 1991). These constructs are seen as the key determinants of an individual's usage intention and behavior (Venkatesh *et al.*, 2003). The theory also communicates four variables that moderates the impact of the four main constructs on UI and behavior. These are gender, age, experience and voluntariness of use (Venkatesh *et al.*, 2003).

UTAUT has been used in the field of mobile payment research to evaluate or investigate the factors affecting the acceptance and use of mobile payments by individuals (Abrahão, Moriguchi, and Andrade, 2016; Liébana-Cabanillas *et al.*, 2014; Oliveira *et al.*, 2016). Oliveira *et al.* (2016), for example, adopted the UTAUT in their study to explore the determinants of the adoption of the individual and the intention to recommend mobile payment systems. Findings from their study revealed that perceived technology, innovativeness, social influence, compatibility, perceive security and performance expectations have major direct and indirect effects on the acceptance of mobile payments and the intention to endorse the technology. Notwithstanding, UTAUT has also faced some criticisms. Bagozzi (2007), critiqued that UTAUT and its subsequent extensions by claiming that “UTAUT is a well-meaning and thoughtful presentation,” but provides a model of forty-one (41) independent variables predicting intentions and at least eight (8) independent variables predicting behavior and that it led to the study of technology adoption “reaching a stage of chaos.” He instead proposed a unified theory that coherers the “many splinters of knowledge”. Van Raaij and Schepers (2008) also criticized UTAUT for being less parsimonious than previous TAM and TAM2 because its high R Squared can only be achieved by moderating key relationships

with up to four variables. Furthermore, they argued that the grouping and labeling constructs and items in UTAUT is problematic because a wide range of different items has been merged to represent a single psychometric construct.

2.13 Geographical Issues in Mobile Payment Research

This section deals with the allocation of articles according to their geographical context of focus. Literature reviewed for this study indicates that 22.5% of articles had no geographical linkage whilst the remaining 77.5% had a geographical linkage. The regions of articles that had a geographical linkage were; Asia (53%), Europe (29%), the Americas (12%). However, the concern of articles related to Africa (6%) is what poses a concern. For example, authors such as Anthony and Mutalemwa (2014), Gichuki and Mulu-Mutuku (2018), Lema1 (2017), Marion (2010) in their respective studies of mobile payment adoption in Africa advocated for future researchers to turn their attention to mobile payment adoption in African countries as there exists limited studies.

2.14 Research Gaps and Directions for Future Research

Literature reviewed for this study reveals that a few gaps exist which need attention. First, extant research on mobile payment has largely concentrated on initial adoption and usage of mobile payment (Chang *et al.*, 2016; Ozturk *et al.*, 2017; Yonghee *et al.*, 2016). This has created a dearth of research on post-adoption studies of mobile payment (Zhou, 2014). In addition, previous studies on initial adoption have largely concentrated on the functional benefits individuals derive from mobile payment that affects adoption and use. For these studies, mobile payment is a service that adds functional value to its users (Chang *et al.*, 2016; Ozturk *et al.*, 2017) rather than a non-

functional one. As a result, future studies can undertake studies to examine how both functional and non-functional benefits affect mobile payment use intention.

In addition, literature reviewed on mobile payment revealed that limited studies have been conducted in the developing country context especially Sub-Saharan Africa. This includes the studies of (Anthony and Mutalemwa, 2014; Gichuki and Mulu-Mutuku, 2018; Lema1, 2017; Marion, 2010) who have called for more studies on mobile payment to be carried in African countries.

Finally, literature reviewed revealed that considerable studies conducted on mobile payment adoption have relied on adoption theories such as TAM and UTAUT (Kim *et al.*, 2010; Mun *et al.*, 2017). However, some researchers have criticized these theories (eg. TAM) for not being able to appropriately explain user's behavior (Hai and Kazmi, 2015; Lim *et al.*, 2016) and therefore the need for future studies to consider relying on other theories that appropriately explain user behavior.

2.15 Chapter Summary

This chapter reviewed literature on FinTech origin, related concepts, FinTech ecosystem, advances in FinTech, and mobile payment. In addition, literature review found many study gaps in mobile payment research that remain unanswered.

CHAPTER THREE

THEORY AND HYPOTHESIS DEVELOPMENT

3.1 Introduction

This chapter deduces the development of the research hypothesis and the research model adopted to carry out this study. Furthermore, in the theoretical stance of this study, it was realized that the theory of Uses and Gratifications (U&G), as proposed by Katz, Blumler, and Gurevitch (1974), was appropriate for this study as the study aimed at identifying and examining the gratifications driving the attitude and continuance use of mobile payments.

3.2 Uses and Gratification Theory

This study is based on the foundations of the theory of Uses and Gratifications (U&G), as suggested by Katz *et al* (1974), to identify and examine gratifications that drive the attitude continuance use of mobile payments. The theory of U&G provides a way to understand why and how individuals actively seek specific media to meet their specific needs (Severin and Tankard, 1997). Furthermore, the U&G theory does not only try to clarify which psychological or social desires influence individuals to choose certain contents and media channels but also the attitudinal and behavioural outcomes (Ruggiero, 2000). The theory of U&G argues that individuals are very active in selecting their own media channels while assessing the potential benefits after using the specific media (Lee and Ma, 2012). Such possible benefits after the use of the selected media are termed as gratifications obtained or gratifications sought (Lo and Leung, 2009). That is, when users are gratified in using a media, they develop a positive attitude towards its use which in turn

affects the continuance use of the media (Ku, Chu, and Tseng, 2013; Xu, Ryan, Prybutok, and Wen, 2012).

The U&G theory has been adopted and applied by extant researchers in the various IS disciplines. For instance, the U&G theory has been applied in areas such as mass media research and for communications among individuals through mobile, the internet and online (Chiang, 2013; Chou and Liu, 2016; Ha, Kim, Libaque-Saenz, Chang, and Park, 2015; Ifinedo, 2016; Smock, Ellison, Lampe, and Wohn, 2011; Lee and Ma, 2012), e-commerce (Azam, 2015; Huang, 2008; Zamzuri, Kassim, Shahrom, Humaidi, and Zakaria, 2018) and mobile applications (Bryant and Sheldon, 2017; Ho and Syu, 2010; Kim, Yoon, and Han, 2016; Lee and Cho, 2017; Nicholas Gerlich, Drumheller, Babb, and De'Armond, 2015). Even though previous research has applied the theory in considerable areas in the IS domain, there exists a dearth of studies that have adopted and applied the U&G theory in the area of mobile payment research. Considerable mobile payment studies have largely adopted theories such as TAM, UTAUT, and DIO. Though the relevance of these theories in the IS domain cannot be underplayed, some researchers have criticized these theories (eg. TAM) for not being able to appropriately explain user's behavior (Bagozzi, 2007; Hai and Kazmi, 2015). For example, Bagozzi (2007) argued that TAM is not a suitable model for investigating and explaining usage behavior, because perceived ease of use and perceived usefulness may not adequately analyze user behavior. Therefore, the need for future studies to adopt other theories that appropriately explain user behavior.

Therefore, to examine the post-adoption behaviour of individuals in terms of both functional and non-functional benefits driving the attitude and continuance use of mobile payments, it is prudent

to adopt a model that incorporates the constructs of both functional and non-functional benefits and similarly supports post-adoption studies. The study, therefore, leans on the U&G theory in order to achieve its set objectives.

Reviewed literature indicates that user gratification categories include gratifications obtained from information acquisition and understanding of the surrounding environment (cognitive), gratifications obtained from joyful experience (hedonic), gratifications sought from strengthening the sense of trust, individual trust, connection with our friends and family (integrative) (Batra and Ahtola, 1991; Ha *et al.*, 2015). Similarly, prior studies that have examined user motivation or intention to use mobile payment services have identified usefulness, ease of use, and convenience as key determinants of mobile payment behaviour (Chang *et al.*, 2016; Chuang *et al.*, 2016; Kim, Park, Choi, and Yeon, 2015; Mun *et al.*, 2017; Yonghee *et al.*, 2016). Therefore, relying on these evidence, six gratifications obtained constructs were identified, that is, cognitive, hedonic, integrative, ease of use, convenience and usefulness. Figure 3.1 shows the research model adopted for this study.

3.3 Hypothesis Development

3.3.1 Cognitive and Attitude toward the use of Mobile Payments

Previous studies have used similar constructs such as utilitarian, information and learning (Batra and Ahtola, 1991; Calder, Malthouse, and Schaedel, 2009; Nambisan and Baron, 2007). According to Nambisan and Baron (2007), cognitive gratification is associated with information on products and events, curiosity, consultation, and the gaining of knowledge. In IS contexts, utilitarian value has been studied. In their study, Ozturk *et al.* (2017) found that utilitarian value

significantly influences users' acceptance of mobile payment technology. In addition, Chang *et al.* (2016), in their study of the motivating factors that influence or drive Chinese customers to adopt mobile payment, postulated that utilitarian benefits influence the attitude towards mobile payment use. Results from this study however remains inconclusive and as such this study adopts and extends these shreds of evidence to postulate that cognitive gratification is positively associated with the attitude towards mobile payment use. Therefore, the first hypothesis of this study state that;

H1: Cognitive gratification is positively associated with the attitude towards mobile payment use.

Furthermore, the study argues that education significantly moderates the relationship between cognitive gratification and attitude towards use. Highly educated individuals are concerned about seeking information about the benefits and possible demerits of using technology before they adopt it (Clemes, Gan, and Du, 2012; Hernández, Jiménez, and Martín, 2011; Tiruwa, Yadav, and Suri, 2018). That is, highly educated individuals are mostly concerned about satisfying their curiosity, and as such learn more about technology before adopting and using it. When they adopt and use technology, they obtain cognitive gratification which affects their attitude towards using technology. Therefore, the study hypothesizes that;

H1a: Education will significantly moderate the relationship between Cognitive gratification and Attitude towards mobile payment use.

In addition, cognitive gratification entails value for money. That is, individuals should enjoy better value for money when they use technology (Sheth, Newman, and Gross, 1991). Lower-income groups will be more concerned about obtaining good value for money when using mobile payment

and higher income will not be too concerned as they possess the purchasing power. Therefore, the study hypothesizes that;

H1b: Income will significantly moderate the relationship between Cognitive gratification and Attitude towards mobile payment use

3.3.2 Hedonic and Attitude toward the use of Mobile Payments

Previous literature refers to hedonic gratification as the gratification of a reinforcing joyful experience. Thus, the aesthetics of deviation, rest, enjoyment and time spent (Batra and Ahtola, 1991; Chiang, 2013; Nambisan and Baron, 2007). Previous studies used similar concepts of gratification such as escapism, enjoyment, time passing and intrinsic enjoyment (Azam, 2015; Chiang, 2013; Ifinedo, 2016; Leung and Zhang, 2015; Nambisan and Baron, 2007; Smock *et al.*, 2011). For instance, Ha *et al.* (2015), in their study of the gratification sought from social networking sites (SNS) by users in Korea, found out that hedonic gratifications play a direct influence on users' attitudes towards mobile SNS use.

Similarly, Azam (2015) conducted a study on the gratifications obtained by undergraduate students in major universities in the city of Riyadh, Saudi Arabia from website use. Results from the study revealed that entertainment gratification played a major role in influencing a student's attitudes towards website use. However, literature reviewed on mobile payment use intention indicates the existence of a huge gap in relation to hedonic gratification. This can be largely attributed to the fact that previous research in the mobile payment space have argued that, users largely drive functional benefits via using mobile payments (Ozturk *et al.*, 2017). Therefore, this study aims to fill this gap inherent in mobile payment literature by postulating that, hedonic gratifications

obtained from mobile payment use positively affect attitudes towards mobile payment use. This leads to the second hypothesis that states that;

H2: Hedonic gratification is positively associated with the attitude towards mobile payment use.

3.3.3 Integrative and Attitude toward the use of Mobile Payments

According to Nambisan and Baron (2007), integration is the idea that is made up of both personal and social integration from the view of social relationships outcome. They further make it clear that integrative gratification relates to the gratification of making or creating an identity, increasing individual values and creating a sense of belongingness or closeness by using a particular media. Ha *et al.* (2015), in their study of SNS gratifications among users in Korea found out that integrative gratification had a major influence on user's attitudes towards SNS use in Korea. This result is consistent with previous studies such as (Hausman and Siekpe, 2009; Weiser, 2001) that were conducted on SNS gratification. In the mobile payment research domain, there exists a dearth of studies employing the integrative construct in their research model. Therefore, aiming to fill this gap, the study extends this evidence, to postulate that integrative gratification is positively related to attitude towards mobile payment use. This leads to the third hypothesis that states that;

H3: Integrative gratification is positively associated with the attitude towards mobile payment use

In addition, extant research has largely ignored the moderating role of education on the relationship between integrative gratification and attitude towards mobile payment use. Nambisan and Baron (2007) makes it clear that integrative gratification relates to the gratification of making or creating identity, increasing individual values and creating a sense of belongingness or closeness by using a particular media. Therefore, this study argues that one's level of education significantly

influences the relationship between his or her integrative gratification and attitude towards mobile payment use. The higher the level of education of an individual, the more he or she wants to create an identity of belonging to a particular class of people by using mobile payments. Hence the hypothesis;

H3a: Education significantly moderates the relationship between Integrative gratification and Attitude towards mobile payment use.

3.3.4 Ease of use and Attitude toward the use of Mobile Payments

Davis (1989, p.320) describes *ease of use* “as the degree to which a person believes that using a particular system would be free from effort”. In their analysis of critical factors affecting millennial use of mobile payment services in Malaysia, Mun *et al.* (2017) found that perceived ease of use was a significant factor influencing the use of mobile payment services by millennials. Similarly, Chuang *et al.* (2016) conducted a study to understand consumers' behavioural intentions in using mobile payment services in Taiwan. Findings from their studies revealed that, once mobile payment service is easy to use, consumers will patronize it more and more. Ease of use positively affects attitude towards mobile payment use. Therefore, based on these, the study argues that individuals who have adopted mobile payments will derive a gratification related to ease of use, that is, once the payment system is *ease to use*, attitude towards use is positively affected or grows. Therefore, the study postulates that, ease of use gratification positively affects attitude towards mobile payment use. Hence the hypothesis;

H4: Ease of use gratification is positively associated with the attitude towards mobile payment use.

An individual's level of education is considered to influence the behaviour of his or her technological adoption. Previous research found that the level of education of an individual has a positive effect on perceived ease of use (Agarwal and Prasad, 1999). That is, when an individual is highly educated, he or she is exposed to the ease that comes with using technological innovations (Clemes *et al.*, 2012). As such, individuals of that nature preferably rely on technological innovations to make life better. Therefore, this study posits that education significantly moderates the relationship between ease of use gratification and attitude towards mobile payment use. The study argues that, if an individual is educated, he or she finds it easy to use mobile payments and as such obtains the gratification of ease of use which further influences attitude towards use. Hence the study hypothesizes that;

H4a: Education significantly moderates the relationship between ease of use gratification and Attitude towards mobile payment use

Income is another variable that previous research on technology acceptance has given considerable attention (Hernández *et al.*, 2011; Tiruwa *et al.*, 2018). For example, Hernández *et al.* (2011) in their study found out that, income significantly moderated the relationship between perceived ease of use and attitude. That is, lower-income groups are most concerned about the ease that comes with using technology due to their low purchasing power. Higher-income groups are mainly not concerned about the ease that comes with using a particular technology as they have the ability to withstand the possible financial loss. Higher-income groups are mainly concerned about the technology and not the ease that comes with using it. This study, therefore, posits that income significantly moderates the relationship between ease of use gratification and attitude towards mobile payment use. Therefore, the hypothesis;

H4b: Income significantly moderates the relationship between ease of use gratification and Attitude towards mobile payment use

3.3.5 Convenience and Attitude toward the use of Mobile Payments

Dewan and Chen (2005) refer to convenience as a possible gain that mobile payments deliver to users as a result of its innovative and technological features, that is, the need to carry a wallet filled with cash. Previous studies on mobile payment have identified convenience as one of the major factors influencing attitude towards mobile payment use. This includes the studies of (Kim *et al.*, 2015; Ozturk *et al.*, 2017; Ryu, 2018; Yonghee *et al.*, 2016). For example, the study of Ozturk *et al.* (2017) carried out on users' acceptance of mobile payment technology revealed convenience as a critical factor that influences attitude towards mobile payment use. Extending on these, the study postulates that, convenience gratification from mobile payment use will positively affect attitudes towards mobile payment use. When users enjoy the convenience that comes with mobile payment use, it can increase their use of technology. Therefore, the hypothesis;

H5: Convenience gratification is positively associated with the attitude towards mobile payment use

3.3.6 Usefulness and Attitude toward the use of Mobile Payments

Davis (1989, p.320) defines perceive usefulness as “the degree to which a person believes that using a particular system would enhance his/her job performance”. Findings from previous studies on user’s motivations for using mobile payment have identified perceive usefulness as an important or essential element influencing users attitude to use the technology (Chuang *et al.*, 2016; Kim *et al.*, 2015; Mun *et al.*, 2017; Yonghee *et al.*, 2016). Therefore, based on these findings,

this study argues that adopting mobile payment will result in users obtaining gratifications related to usefulness. Thus, because it enables users to carry out their financial transactions which so much ease. Based on this, the study postulates that usefulness gratification will positively affect user's attitude towards mobile payment use and as such the hypothesis;

H6: Usefulness gratification is positively associated with the attitude towards mobile payment use.

In addition, extant research has found that an individual's level of education significantly influences his or her perceived usefulness of a technology (Agarwal and Prasad, 1999). When an individual is highly educated, he or she is made aware of the importance of adopting and using technological innovations as such, he or she uses it more (Clemes *et al.*, 2012). Therefore, the study argues that, if an individual is highly educated, he or she learns about the benefits of using mobile payment and as such adopts and uses it. When the mobile payment is adopted, the individual obtains a gratification of usefulness which affects attitude towards use. Hence the hypothesis that:

H6a: Education significantly moderates the relationship between Usefulness gratification and Attitude towards mobile payment use.

Furthermore, previous studies have been conducted to unearth the moderating effects of income on perceived usefulness and attitude towards use. For instance, Tiruwa *et al.* (2018) in their study of the moderating effect of income on online brand community induced purchase intention found out that, income significantly moderated the relationship between perceived usefulness and purchase intention. That is, individuals from a lower income group showed a more significant relationship than the higher income group for perceived usefulness and purchase intention. Therefore, this study posits that income significantly moderates the relationship between

usefulness gratification and attitude towards use. This study argues that a lower group would be more concerned about getting information about the usefulness of mobile payment whilst a higher income group will not be as concerned about these details as they have the purchasing power and care more about the product and not the details. That is, a lower income group will be more concerned about obtaining a gratification of usefulness whilst a higher income group would not be too concerned given their purchasing power. Therefore, the hypothesis;

H6b: Income significantly moderates the relationship between Usefulness gratification and Attitude towards mobile payment use

3.3.7 Attitude and Continuance use intention of Mobile Payments

Ajzen (2001) referred attitude to as the summed rating of the psychological state that captures dimensions such as good or bad, harmful, or beneficial as well as pleasant and unpleasant. The theory of reasoned action (TRA) that enables researchers to predict how people will behave based on their pre-existing attitudes and behavioural intentions is made up of constructs such as attitude, intention, and behaviour. Attitude leads to intention and intention in turn leads or results to behaviour (Fishbein and Ajzen, 1976). Considerable studies have been carried out in various fields of academia to study how well attitude affects actual behaviour (Ajzen, 2001). For instance, in IS research, findings from the studies of (Chuang *et al.*, 2016; Ozturk *et al.*, 2017) on factors that influence users attitude towards mobile payment use revealed that, once an individual has a positive or negative attitude towards mobile payment use, actual use is affected by the attitude. That is, a positive attitude would mean more use and a negative attitude will lead to less or no use of the technology. Based on this, the study argues that attitude towards mobile payment use is

positively associated with continuance usage. That is, if users develop positive attitudes towards usage, continuance use will increase. Hence the final hypothesis;

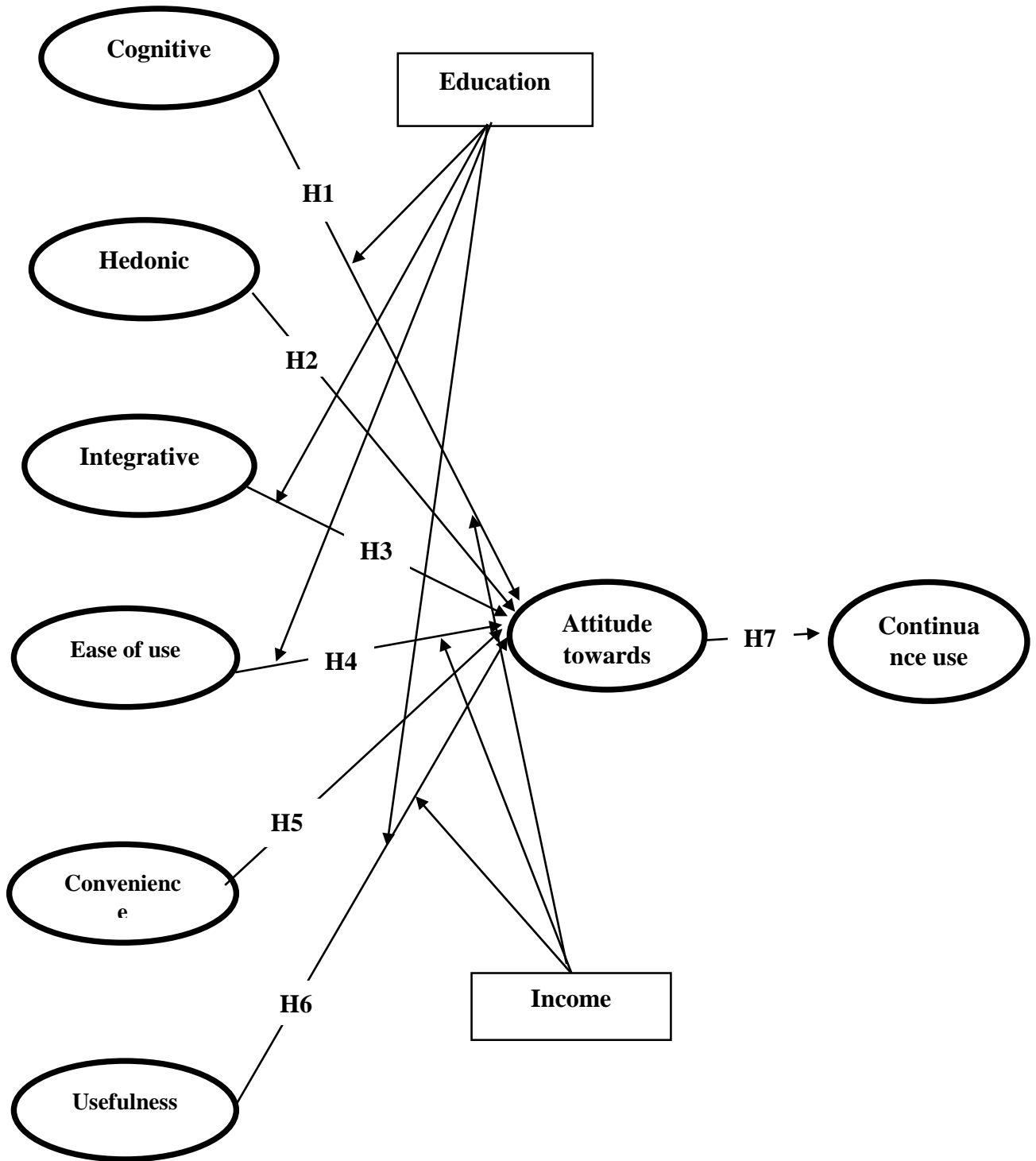


Figure 3. 1 Conceptual Model of the Research

3.4 Summary

This chapter discussed the research model that was adopted for this study. The study leaned on the foundations of the Uses and Gratifications Theory in order to identify and examine the gratifications driving the attitude and continuance use of mobile payments in Ghana. This theory was selected over theories such as TAM and UTAUT because it aided the research to incorporate both functional and non-functional constructs in the research model. In addition, the theory supports post-adoption studies in the field of IS.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

The previous chapter focused on the theory and hypothesis development of this study where the Uses and Gratifications theory was reviewed. This chapter continues with the research methodology position by examining the gratifications and continuance use of mobile payment in Ghana. The chapter focuses on further discussions on the research paradigm, research method, participants setting, data collection instrument, data collection process and method of the data analysis technique.

4.2 Research Paradigm

Kuhn (1970, p.175), defines a research paradigm as the “set of beliefs, values, and techniques which is shared by members of a scientific community and which acts as a guide or map, dictating the kinds of problems scientists should address and the types of explanations that are acceptable to them”. Research paradigms consist of three dimensions and these are Ontology, Epistemology, and Methodology (Lincoln and Guba, 2011). Firstly, Ontology relates to the belief about what is there to know about the world. In social research, key ontological questions that arise are whether there exists a common reality or multiple context-specific realities, whether social reality exists without human conceptions and interpretations and whether social behavior is governed by a set of laws that can be seen as generalizable (Ritchie and Lewis, 2005). Secondly, Epistemology relates to knowing and discovering about the social world and centers on questions that include “how can we know about reality; and what is the basis of our knowledge” (Ritchie and Lewis,

2005, p.13). Lastly, Methodology pertains to the methods involved in the collection of data, analysis of data and arriving at valid conclusions from the analysis in order to add to the body of knowledge (Lincoln and Guba, 2011). Additionally, methodology seeks to guide how knowledge (epistemology) can be discovered with the help of knowing what exists (ontology). There are three main paradigms that have been developed over the years in Information Systems (IS) research. These paradigms are Positivism, Interpretivism and Critical Realism (Mingers, 2004).

The positivist paradigm maintains that real cases or events can be observed empirically and defined or analyzed with legitimate or logical analysis. The standard for assessing the validity of a scientific theory is whether theoretically based predictions are coherent with information gathered using one's senses (Leong, 2014). Positivists maintain that different researchers observing the same phenomenon or problem will generate similar outcomes if they apply a similar statistical test and research process in examining a large sample (Creswell, 2009b). Thus, positivists believe that generalizations can be applied across contexts (Wahyuni, 2012).

The **Interpretivism paradigm** holds that reality is formed by social actors and individual's perceptions of it. That is, interpretivism believes that people with different backgrounds, experiences, and assumptions contribute to the ongoing formation of reality existing in their broader social context through various social interactions (Wahyuni, 2012). Interpretivist prefer to interact and have a dialogue with studied respondents so as to gain the interpretations of individuals on a phenomenon. As such, they prefer to work with qualitative data which presents rich descriptions of social constructs (Wahyuni, 2012).

Critical realism bridges the gap between the epistemology of the positivist and the ontology of the interpretive (Mingers, 2004). Critical realism holds that there exist some unobservable events that influence the observable ones. That is, the social world can only be understood if individuals seek to understand the structures that bring about such unobservable events. This is essential in the experimental context as it permits the researcher to differentiate between the event and what leads to it. According to Critical realism, a researcher undertaking a study or experiment creates the conditions necessary for the study (observable events), but the outcomes of the study are stimulated by the underlying laws and mechanisms (unobservable events) (Sharpe and Bhaskar, 1976).

Having provided the background on the three main paradigms in IS research, this study leans on the Positivist paradigm as its guiding lens. The researcher's choice of this type of paradigm is justified by the purpose of this study which aims at identifying and examining gratifications that drive attitude and continuance use of mobile payments in Ghana. The study forms associations with dependent variables (i.e. Cognitive, Hedonic, Integrative, etc. gratifications) and the independent variable. Corbin and Strauss (2008) stated that, unlike the other paradigms, positivism allows the researcher to discover regularities in and form associations between some elements or constructs, through the manipulation of reality with changes in a single independent variable. In addition, this study seeks to analyze data gathered using Partial Least Squares -Structural Equation Modelling (PLS-SEM) and attempts to test the Uses and Gratifications theory in the area of mobile payments whilst drawing on some hypotheses. Leong (2014) states that positivism aids the researcher to empirically observe real events and explain using logical analysis. Furthermore, with positivism, the standard for assessing the validity of a scientific theory is whether theoretically based predictions are coherent with information gathered using one's senses (Leong, 2014).

4.3 Research Methods

A research method is a set of procedures, tools, and techniques to collect and analyze data (Wahyuni, 2012). Johnson and Onwuegbuzie (2004) stated that there are two main categories of research methods that are widely used by researchers. They are Qualitative and Quantitative techniques. Qualitative methods are associated with the Interpretivist paradigm and Quantitative methods are linked with the Positivist paradigm (Mingers, 2004). This study adopted a quantitative research method specifically survey. A survey gives a quantitative description of the opinions of a population by studying a sample of that population (Creswell, 2009b). A survey is a kind of quantitative research approach that is grounded in the positivist paradigm. Furthermore, a survey consists of cross-sectional studies using questionnaires for data gathering with the aim of generalizing from a sample to a population (Babbie, 1990). This study is a cross-sectional one that relies on questionnaires as its data collection instrument.

4.3.1 Questionnaire Development

As earlier stated in this chapter, the study adopted a survey quantitative approach. Questionnaires were administered in order to obtain data from respondents. During the development of the questionnaire, there was a need to follow the guidelines of (Churchill, 1979; Straub, 1989). This was to ensure the reliability and validity of the data collection instrument. As proposed by Churchill (1979) and Straub (1989), survey instrument development includes initial instrument development and instrument refinement.

The survey instrument (questionnaire) was developed by reviewing literature on mobile payment adoption and use. From reviewing literature, the Uses and Gratifications theory was adopted, and

items were generated for each construct. After the development of the questionnaire, a pre-test of the instrument was undertaken before a pilot test was done (Churchill, 1979; Straub, 1989). A pre-test of the questionnaire was carried out by soliciting expert views and opinions regarding the test items. They provided constructive feedback which helped in improving the content of the questionnaire. This process was undertaken in order to guarantee content validity (Straub, Boudreau, and Gefen, 2004). After making changes to some sections of the questionnaire through expert feedback, a pilot test was conducted. A pilot test was conducted on forty (40) respondents who use mobile payments (that is, *MoMo*, Mobile Banking and both). Feedback from respondents was positive and this meant the questionnaire demonstrated a significant level of content validity Straub *et al.* (2004) and therefore, was ready to be used for data collection.

4.3.2 Survey Design

The questionnaire developed for this study included three parts. Part A concentrated on the demographics of the respondents. This included questions such as Gender, Age, Marital status, Occupation, and Monthly income. Part B focused on mobile payment usage. Questions such as mobile payment service used, frequency of use and duration of use were included in this part. The final part, that is, Part C focused on the factors that drive gratifications obtained from mobile payment use. This part included six (6) gratifications obtained constructs. That is, Cognitive, Hedonic, Integrative, Ease of use, Convenience and Usefulness gratifications. In addition, this part included questions on Attitude towards use and Continuance use of Mobile Payments. Literature reviewed unearthed all constructs as well as indicators used to measure the constructs. Items evaluating the individual constructs were also estimated using a five-point Likert-type scale with ranges from 1=Strongly disagree to 5=Strongly agree. The five-point Likert-type scale has been

regarded as providing accurate and consistent outcomes for multivariate analysis (Hair, Black, Babin, and Anderson, 2010). Table 4.1 gives a summary of the constructs adopted for this study.

Table 4. 1 Constructs and the number of items used in this study

Constructs	Number of Items	Adapted from
Cognitive Gratification	5	Calder <i>et al.</i> (2009), Mimouni-Chaabane and Volle (2010), Nambisan and Baron (2007)
Hedonic Gratification	4	Nambisan and Baron (2007)
Integrative Gratification	4	Nambisan and Baron (2007)
Ease of use Gratification	4	Davis (1989), Saadé (2007)
Convenience Gratification	4	Ryu (2018)
Usefulness Gratification	4	Davis (1989)
Attitude towards use	4	Ajzen (2001)
Continuance use	4	Bhattacharjee (2001), Shao <i>et al.</i> (2019)

Source: Author's construction

4.3.3 Participants Setting

Respondents were individuals who reside in Ghana. Specifically, respondents who use or have used mobile payment were sampled for this study as the purpose of this study was to identify and examine the gratifications that drive mobile payment use.

4.3.4 Sample Selection

A good sample is one that is a representation of a population from which, when data is collected and analyzed, results can be consistent with the results that would have been obtained if data was collected on the entire population (Fricker, 2008). Therefore, if the consistency and reliability of results are to be achieved, researchers must pay crucial attention to the sample size of their study (Hair *et al.*, 2010). Thus, to achieve sample adequacy, the tenets of PLS-SEM was adhered to. The most widely utilized minimum sample size estimation method in PLS-SEM is the “10- times rule” method (Hair, Ringle, and Sarstedt, 2011; Peng and Lai, 2012). The “10-times rule” emphasizes

that the minimum sample size for a study should be more than “10 times” the maximum number of inner or outer model links leading to any of the constructs in the model (Goodhue, Lewis, Thompson, and Thompson, 2012). That is, from the research model of this study presented in Chapter Three, the construct with the highest number of indicators is Cognitive Gratification (5 indicators). As such the minimum sample size required for this study according to the “10-times rule” is calculated as $5 \times 10 = 50$. Therefore, a minimum of 50 respondents is required for this study. However, this study administered questionnaires to 361 respondents which exceeded the minimum sample size requirement according to the “10-times” rule.

After arriving at the minimum sample size required to undertake this study, it was necessary to adopt a sampling technique that will aid in data collection. This study, therefore, adopted a non-systematic approach of convenience sampling as its sampling technique. The study adopted convenience sampling due to its being cost-effective and less time consuming (Schonlau, Fricker, and Elliott, 2002). In addition, due to the dispersed nature of respondents across the country, it was impossible to administer questionnaires to all individuals who use *MoMo*, Mobile Banking or both. Therefore, relying on a convenience sampling technique enabled the researcher to get access to some individuals that were easy to reach in other regions of the country specifically through google forms.

4.3.5 Data Collection Process

This study relied on primary data only. Data for this study was gathered in three (3) steps. That is, survey instrument design, choosing an appropriate sampling frame and administering the questionnaire to respondents. Data was gathered through questionnaires that were designed in line

with the hypothesis developed for the study. This was to ensure that the purpose of the study was achieved in the end. Data were collected from respondents in Ghana who have used or use MoMo, Mobile Banking or both. Questionnaires were administered using google forms and face to face administrations. Respondents were allowed to complete the survey only once. Data were collected from October to November 2019. However, some respondents failed to return prints copies of the questionnaire and others failed to fill out the electronic version as well. As a result, a sum of 361 responses was collected. Out of this number, 195 were electronic copies and 166 were printed copies.

4.4 Method of Data Analysis

Responses from the participants were received. Later, the questionnaires were checked for incompleteness. There were no incomplete surveys, and therefore, the data was ready to be analyzed. Data were coded and organized into combined constructs in Statistical Package for Social Sciences (SPSS) before they were analyzed with the SmartPLS tool.

4.4.1 Partial Least Square in Structural Equation Modelling

Structural Equation Modelling (SEM) is a multivariate data analysis technique that has been widely adopted by IS research for construct validation and testing the relationships between constructs (Gefen, Straub, and Boudreau, 2000). According to Kaplan (2000), SEM is “a class of approaches that aims to represent hypotheses about the means, variances, and covariances of observed data in terms of a smaller number of "structural" parameters defined by a hypothesized underlying model”. There exist two main approaches to SEM. That is, Covariance based SEM (CB-SEM) using software packages such as Mplus, AMOS, LISREL, etc. and Partial Least

Squares SEM, which centers on the analysis of variance and can be undertaken using software packages such as SmartPLS and ADANCO (Hair, Risher, Sarstedt, and Ringle, 2019; Wong, 2019). This study adopted the PLS-SEM approach. This was mainly because, unlike CB-SEM, PLS-SEM is an approach to SEM with no assumptions about data distribution (Vinzi, Chin, Henseler, and Wang, 2010). That is, PLS-SEM is useful in research projects where there are limited respondents and data distribution is skewed (Wong, 2011). In addition, the researcher adopted PLS-SEM because the objective of the study was to examine the relationship between dependent constructs and the independent constructs using the effect size and predictive relevance which is not offered using CB-SEM (Astrachan, Patel and Wanzenried, 2014).

The first step in evaluating or assessing results in PLS-SEM demands examining the measurement models. Essentially, the assessment or estimation of the measurement model aids the researcher to compare the theory adopted for the study and the real data collected for the study as well. The applicable criteria for assessing measurement models differ for formative and reflective constructs (Hair, Risher, Sarstedt, and Ringle, 2019; Urbach and Ahlemann, 2010). This study comprised of constructs that were reflective, a test for reliability and validity of the measurement model before an assessment of the structural model was required. This study assessed for indicator reliability, internal consistency for reliability, convergent validity and discriminant validity by ensuring the application of the standard decision rules (Hair *et al.*, 2019).

After the measurement model had been validated successfully, the next step was to assess the structural model (Hair *et al.*, 2019; Urbach and Ahlemann, 2010). The following five essential steps were used to assess the structural model as suggested by (Hair *et al.*, 2019; Urbach and

Ahlemann, 2010). That is an assessment of the structural model for collinearity issues, assessment of the significance and relevance of structural model relationships, assessment of the Goodness of Fit (GOF), assessment of the effect size (f-square) and assessment of the predictive relevance (q-square). After the assessment of the measurement and structural model was completed, a multi-group analysis was performed in order to examine the effect of moderating variables (income and education) on the relationship between independent construct and the dependent construct.

4.5 Chapter Summary

This chapter discussed the research methodology adopted to answer the research questions of this study. The research paradigm chosen was discussed and justified, as well as the research method, sampling technique, data collection, and analysis method.

CHAPTER FIVE

RESULTS AND ANALYSIS

5.1 Introduction

This chapter reports how the proposed research model is evaluated and tested using PLS-SEM. This chapter has four parts. The first part reports the demographic characteristics of individuals who took part in this study. The second part deals with the assessment of the measurement model for indicator reliability, internal consistency for reliability, convergent validity and discriminant validity by ensuring the application of the standard decision rules. The third part focused on the assessment of the structural model for Multicollinearity issues, goodness of fit, significance of path coefficient, effect size and predictive relevance. The final part assessed the influence of the moderators; income and education on the relationship between the independent constructs and the dependent constructs.

5.2 Demographic Characteristics of Respondents

Table 5.1 gives details about the gender, age, education, occupation, income, among others of the respondents. In total, 361 respondents participated in this study. Data collected revealed that the majority of respondents use MoMo which comprises Mobile Telephone Network (MTN) Mobile Money, Vodafone Cash and AirtelTigo Cash (228 respondents). MoMo service is operated by telecommunication industry players such as MTN, Vodafone, and AirtelTigo. In Ghana, individuals who purchase the Subscriber Identification Module (SIM) card of any of these players are automatically registered for the MoMo service. As such, most individuals in the country use

MoMo services (Bank of Ghana, 2018). This is manifested in the data collected and presented in Table 5.1.

In terms of occupation, students have the highest number (n= 211). This is because students are regarded as millennials and are more techno-savvy than others who have not had any form of formal education. As a result, with a little help, they are able to find their way around the system, unlike the uneducated who need more time and practice. In addition, most of these students fall within the Bachelor's (170) and Master's (118) Degrees bracket and as such, they have a higher chance of being employed.

With regards to income, GHC000 - GHC1000 has respondents of 249 assigned to it. This may be related to the fact that most of these respondents were students and therefore did not earn an income. Respondents of that nature were told to approximate their monthly expenditure and tick where appropriate. With this, most of them fell within the bracket of GHC 0-GHC 1000.

Table 5. 1 Demographic distribution of Respondents

Demographic	Characteristics	Number	Percentage (%)
Gender	Male	218	60.4
	Female	143	39.6
	Total	361	100
Age	15-25years	211	58.4
	26-35years	134	37.1
	36-45 years	13	3.6
	46-55 years	3	8
	Total	361	100
Education	SHS and below	12	3.3
	Diploma	51	14.1
	Degree	170	47.1
	Masters	118	32.7
	PhD	10	2.8
	Total	361	100
Occupation	Student	211	58.4
	Self-employed	47	13
	Public service worker	56	15.5
	Private service worker/NGO	44	12.2
	Unemployed	3	0.8
	Total	361	100
Monthly income	0-GHC1000	249	69
	GHC 1001-GHC2000	47	13
	GHC 2001-GHC3000	29	8
	GHC 3001-GHC4000	15	4.2
	above GHC 4001	21	5.8
	Total	361	100
Mobile payment used	Mobile money	228	61.2
	Mobile banking	21	5.3
	MM and Mobile banking	112	0.6
	Total	361	100
Duration of mobile payments usage	below 4 years	204	56.5
	5-10 years	146	40.4
	above 10 years	11	3
	Total	361	100
Monthly usage of mobile payments	1-4 times	129	35.8
	5-10 times	116	32.1
	above 10 times	116	32.1
	Total	361	100

Source: Author's construction

5.3 Assessment of Measurement Model

The first step in the evaluation of results in PLS-SEM requires the examination of the measuring models. “Model estimation delivers empirical measures of the relationships between the indicators and the constructs (measurement models) as well as between the constructs (structural model)” (Hair, Hult, Ringle, and Sarstedt, 2016, p.105). Essentially, the assessment or estimation of the measurement model helps the researcher to compare the theory adopted for the study and the real data collected for the study as well. For formative and reflective constructs, the applicable criteria for assessing the measurement model differ (Hair, Risher, Sarstedt, and Ringle, 2019; Urbach and Ahlemann, 2010). All the constructs in this study were reflective as such, the need to test the measurement model's reliability and validity before a structural model assessment can be carried out. Thus, this study evaluated the reliability of the indicator, internal consistency for reliability, convergent validity and discriminatory validity by ensuring that the standard decision rules are applied (Hair *et al.*, 2019; Urbach and Ahlemann, 2010).

5.3.1 Indicator Reliability

Indicator reliability is described as the extent to which “a variable or set of variables is consistent regarding what it intends to measure” (Urbach and Ahlemann, 2010, p. 18). In order to check for the indicator reliability, reflective indicator loadings are monitored. Indicator loadings of 0.708 and above are recommended because they show that the construct or latent variable explains more than 50 percent of the variance of the indicator and thus ensures acceptable reliability of the item. (Hair *et al.*, 2019). Not all indicators, however, were significantly loaded on their corresponding latent variables. As a consequence, they were removed from the model (Gefen and Straub, 2005). That is, when the analysis was first run, some of the indicators were less than the minimum

required threshold. Specifically, CG5 was deleted as its indicator loading was 0.606. The model was re-run using the PLS algorithm after CG5 was deleted. All other indicators loaded significantly on their corresponding latent variables. This meant indicators satisfied the minimum threshold requirement. This means they were a good measurement of the latent variables. Results were then extracted in order to conduct an assessment and evaluation of the measurement and structural model. Figure 5.1 shows the indicator loadings after CG5 was deleted and the model re-run using the PLS algorithm.

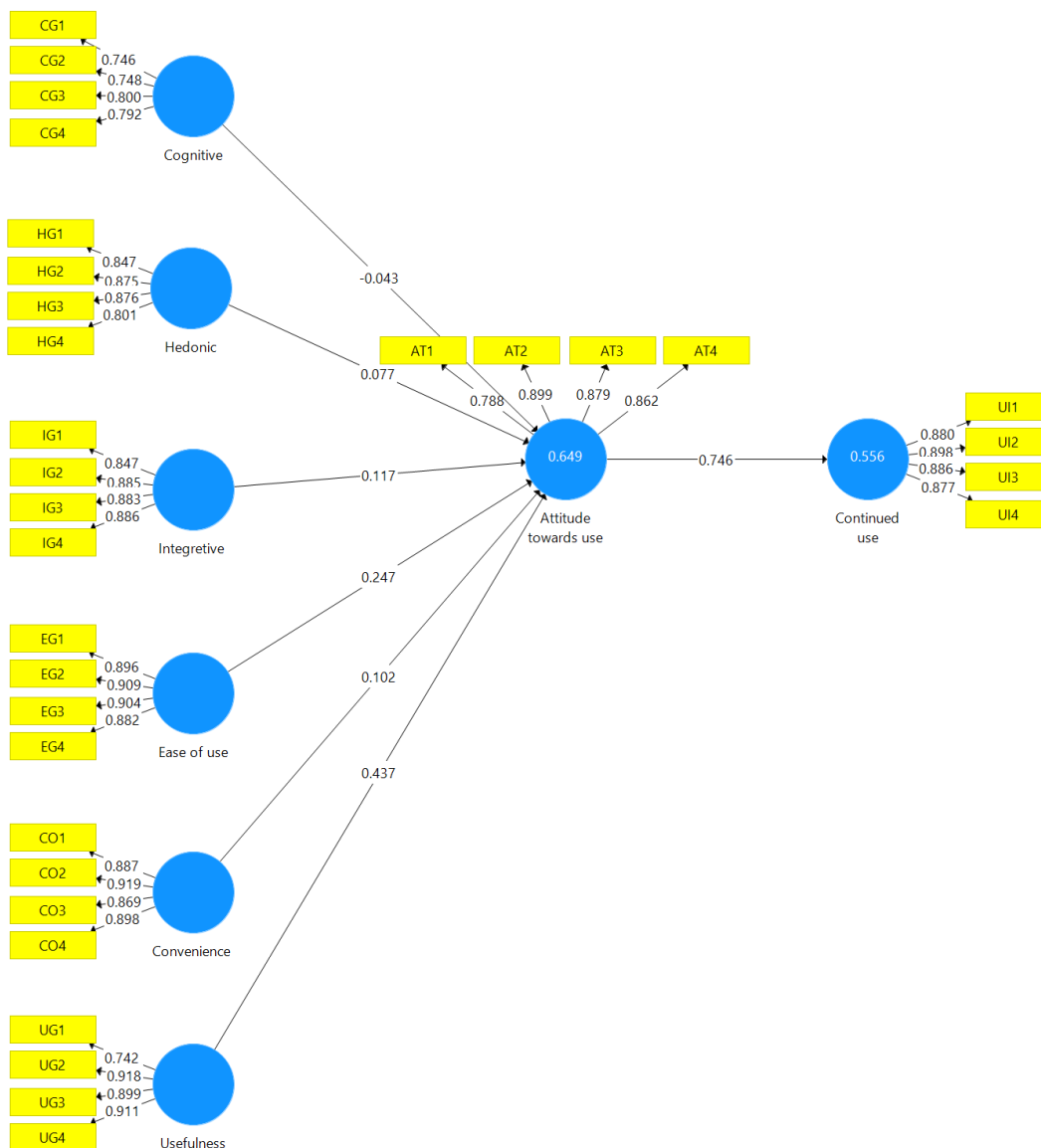


Figure 5. 1 Results of PLS analysis

5.3.2 *Internal Consistency Reliability*

The second step, after testing for the accuracy of the indicator, is to use Cronbach's alpha to test internal consistency quality. The high alpha value of Cronbach's indicate that the scores of all indicators in a latent variable are of the same range and meaning (Cronbach, 1951). The minimum threshold for Cronbach's alpha is 0.70 (Nunnally, 1978). All latent variables or constructs had an Alpha value of over 0.70 for Cronbach's as shown in Table 5.2. It should be noted that researchers have criticized the Cronbach's alpha for showing lower values and being a less accurate measure of reliability as the items are unweighted (Hair *et al.*, 2019; Urbach and Ahlemann, 2010). As such, an alternative measure was suggested for indicator reliability. That is Joreskog's (1971) composite reliability.

Joreskog (1971) Composite reliability was introduced to address the shortfalls of Cronbach's alpha (Urbach and Ahlemann, 2010). Composite reliability assumes, unlike Cronbach's alpha, that all indicators have different loadings (Henseler, Ringle, and Sinkovics, 2009), and this serves as a better measure of indicator reliability (Chin, 1998). Higher values indicate higher reliability levels, i.e. reliability values between 0.60 and 0.70 are considered to be "acceptable to exploratory research". In addition, values between the ranges of 0.70 and 0.90 indicate "satisfactory to good" and values 0.95 and above are regarded as problematic as they show that the items are more than what is required, thereby leading to a reduction in construct reliability (Diamantopoulos, Sarstedt, Fuchs, Wilczynski, and Kaiser, 2012). Composite reliability values from the results range from 0.85 to 0.943 which indicates "satisfactory" to "good" as indicated in Table 5.2.

In addition to composite reliability, Rho_A is considered an alternative to measure consistency reliability (Dijkstra and Henseler, 2015). Rho_ A values of 0.70 are recommended. All latent variables possess Rho_ A values of more than 0.70 as indicated in Table 5.2.

Table 5. 2 Construct Reliability

Constructs	Cronbach's Alpha^b	rho_A^c	Composite Reliability^d	Average Variance Extracted (AVE)^e
Cognitive	0.781	0.788	0.850	0.533
Hedonic	0.872	0.879	0.913	0.723
Integrative	0.899	0.905	0.929	0.766
Ease of use	0.920	0.920	0.943	0.806
Convenience	0.916	0.916	0.941	0.798
Usefulness	0.892	0.907	0.926	0.758
Attitude towards use	0.880	0.887	0.918	0.736
Continuance use	0.908	0.908	0.935	0.784

5.3.3 Convergent Validity

After evaluating the internal consistency reliability, the next step of the analysis was to assess the convergent validity of each construct. Convergent validity involves the “degree to which individual items reflecting a construct converge in comparison to items measuring different constructs” (Urbach and Ahlemann, 2010 p.19). Average Variance Extracted (AVE) is the criterion used to assess convergent validity (Fornell and Larcker, 1981). To measure the AVE, each indicator loading on a construct must be squared and the mean value determined. The threshold for AVE is 0.50 (Hair *et al.*, 2019). This means that the latent factor or construct explains at least 50 percent of the variability of its items and thus demonstrates sufficient convergent validity (Hair *et al.*, 2019; Urbach and Ahlemann, 2010). Table 5.2 shows AVE values above the minimum threshold of 0.50 and therefore adequate convergent validity was achieved.

5.3.4 Discriminant Validity

The fourth step is to evaluate discriminant validity. Hair *et al.* (2019, p.9) define discriminant validity as the “extent to which a construct is empirically distinct from other constructs in the structural model”. Two measures are commonly used in PLS-SEM to determine or evaluate discriminant validity. The first calculation is the cross-loading resulting from the combination or comparison of each latent variable score with all other items (Chin, 1998). Where each indicator loading is higher for its construct than for any other construct and each of the constructs or latent variables loads highest with its indicators or assigned items, it can be generalized that, the indicators of the latent variable or construct are discriminant of each other. That is, they are not interchangeable. From that 5.3, it can be inferred that the latent variables are discriminant of each other as they load the highest on their assigned constructs than any other construct (s).

Table 5. 3 Indicator Item Cross Loading

	AT	CG	EG	HG	IG	UG	CU	CO
AT1	0.788	0.253	0.534	0.510	0.295	0.388	0.624	0.566
AT2	0.899	0.341	0.670	0.698	0.475	0.315	0.726	0.700
AT3	0.879	0.355	0.649	0.667	0.438	0.293	0.651	0.663
AT4	0.862	0.392	0.568	0.555	0.388	0.345	0.624	0.622
CG1	0.262	0.746	0.290	0.273	0.490	0.261	0.228	0.283
CG2	0.249	0.748	0.259	0.214	0.406	0.382	0.262	0.238
CG3	0.303	0.800	0.425	0.381	0.475	0.346	0.367	0.308
CG4	0.370	0.792	0.415	0.438	0.632	0.227	0.398	0.331
CO1	0.634	0.410	0.887	0.727	0.462	0.256	0.715	0.588
CO2	0.634	0.409	0.919	0.716	0.409	0.280	0.760	0.594
CO3	0.646	0.416	0.869	0.656	0.427	0.334	0.698	0.588
CO4	0.617	0.411	0.898	0.701	0.400	0.246	0.764	0.556
EG1	0.634	0.393	0.703	0.896	0.429	0.232	0.663	0.611
EG2	0.629	0.394	0.692	0.909	0.450	0.262	0.663	0.595
EG3	0.627	0.408	0.698	0.904	0.460	0.297	0.687	0.582
EG4	0.669	0.380	0.719	0.882	0.398	0.280	0.717	0.613
HG1	0.351	0.582	0.379	0.398	0.847	0.375	0.362	0.334
HG2	0.405	0.570	0.434	0.433	0.875	0.288	0.412	0.358
HG3	0.447	0.569	0.461	0.479	0.876	0.335	0.454	0.448
HG4	0.386	0.534	0.333	0.322	0.801	0.486	0.334	0.356
IG1	0.288	0.282	0.182	0.176	0.326	0.847	0.202	0.270
IG2	0.340	0.332	0.275	0.287	0.386	0.885	0.287	0.317
IG3	0.351	0.366	0.307	0.294	0.398	0.883	0.343	0.336
IG4	0.369	0.356	0.316	0.274	0.398	0.886	0.332	0.328
UG1	0.537	0.260	0.617	0.507	0.266	0.290	0.742	0.424
UG2	0.708	0.430	0.812	0.732	0.480	0.296	0.918	0.627
UG3	0.676	0.398	0.692	0.660	0.405	0.312	0.899	0.643
UG4	0.731	0.352	0.731	0.726	0.436	0.283	0.911	0.641
UI1	0.684	0.318	0.583	0.58	0.350	0.295	0.567	0.880
UI2	0.658	0.374	0.584	0.618	0.414	0.325	0.600	0.898
UI3	0.638	0.311	0.517	0.533	0.365	0.369	0.562	0.886
UI4	0.659	0.346	0.619	0.636	0.442	0.286	0.672	0.877

The Fornell and Larcker (1981) criterion is the second measure for discriminant validity. Fornell and Larcker (1981) suggest that a latent variable should share more variance with the indicators assigned to it than with any other latent variable in order to achieve discriminant validity. In a nutshell, the AVE of each latent variable should surpass the highest square correlation of the latent

variable with other latent variables. From Table 5.4, it can be seen that the various latent variables share more variance with their assigned indicators than with other latent variables. This is denoted by bolding the numbers in the Table. It can also be seen that the bold numbers show the highest values in both rows and columns. In this case, we can infer that discriminant validity has been met.

Table 5. 4 Discriminant Validity (Fornell-Larcker Criterion)

	AT	CG	CU	CO	EG	HG	IG	UG
Attitude towards use	0.858							
Cognitive	0.392	0.772						
Continuance use	0.746	0.381	0.885					
Convenience	0.709	0.461	0.651	0.893				
Ease of use	0.713	0.438	0.669	0.783	0.898			
Hedonic	0.47	0.662	0.443	0.476	0.483	0.850		
Integrative	0.388	0.384	0.359	0.313	0.298	0.433	0.875	
Usefulness	0.767	0.418	0.678	0.822	0.761	0.463	0.337	0.871

Researchers have critique Fornell and Larcker (1981) criterion as not being a suitable metric for assessing discriminant validity. For example (Henseler, Ringle, and Sarstedt, 2015) suggest that the Fornell and Larcker (1981) test does not work well in situations where indicator loadings on a latent variable differ slightly (for example, where indicator loads range from 0.65 to 0.85). Therefore, as an alternative, Henseler *et al.* (2015) recommend the Heterotrait-Monotrait Ratio (HTMT) of the correlations (Voorhees, Brady, Calantone, and Ramirez, 2016) as a suitable metric for assessing discriminant validity. Henseler *et al.* (2015) proposed the superior performance of HTMT by means of Monte Carlo simulation study and results indicated that HTMT is able to achieve higher sensitivity and specificity rates (that is, 97%-99%) as compared to cross-loadings and Fornell and Larcker (0.00% and 20.82% respectively). HTMT is defined as “the mean value of the item correlations across constructs relative to the (geometric) mean of the average correlations for items measuring the same construct” (Hair *et al.*, 2019, p.9).

Table 5. 5 Discriminant Validity- Heterotrait-Monotrait Ratio (HTMT)

	AT	CG	CU	CO	EG	HG	IG	UG
Attitude towards use								
Cognitive	0.462							
Continuance use	0.832	0.446						
Convenience	0.786	0.531	0.713					
Ease of use	0.787	0.499	0.731	0.853				
Hedonic	0.528	0.787	0.494	0.528	0.536			
Integrative	0.437	0.467	0.396	0.339	0.324	0.49		
Usefulness	0.861	0.484	0.747	0.900	0.833	0.514	0.374	

Problems of discriminate validity arise when HTMT values are higher. A required threshold of 0.90 is recommended (Gold, Malhotra, and Segars, 2001; Henseler *et al.*, 2015). Where HTMT values exceed the threshold of 0.90, it means discriminant validity is absent. As seen in Table 5.5, all HTMT values did not exceed the threshold of 0.90 therefore, discriminate validity has been achieved (Gold *et al.*, 2001; Hair *et al.*, 2019). Furthermore, bootstrapping can be done to determine if the HTMT value differs significantly from 1.00 (Henseler *et al.*, 2015) or the threshold value (that is, 0.90). A “consistent PLS bootstrapping” was performed with a confidence interval of 0.95. The results are shown in Table 5.6.

Table 5. 6 Discriminant Validity: Bootstrapping for Heterotrait-Monotrait Ratio (HTMT)

	Original Sample (O)	Sample Mean (M)	Bias	95% CI LL	95% CI UL
Cognitive -> Attitude towards use	0.462	0.461	-0.001	0.325	0.584
Continuance use -> Attitude towards use	0.832	0.83	-0.001	0.759	0.888
Continuance use -> Cognitive Convenience -> Attitude towards use	0.446	0.446	0	0.31	0.568
Convenience -> Cognitive Convenience -> Continuance use	0.786	0.785	-0.002	0.716	0.841
Ease of use -> Attitude towards use	0.531	0.531	-0.001	0.411	0.637
Ease of use -> Cognitive Ease of use -> Continuance use	0.713	0.71	-0.003	0.616	0.789
Ease of use -> Convenience	0.787	0.784	-0.003	0.711	0.841
Hedonic -> Attitude towards use	0.499	0.497	-0.002	0.377	0.611
Hedonic -> Cognitive Hedonic -> Continuance use	0.731	0.728	-0.003	0.646	0.8
Hedonic -> Convenience	0.853	0.851	-0.002	0.778	0.907
Hedonic -> Ease of use	0.528	0.528	0	0.39	0.649
Integrative -> Attitude towards use	0.787	0.788	0.001	0.703	0.857
Integrative -> Cognitive Integrative -> Continuance use	0.494	0.493	-0.001	0.361	0.621
Integrative -> Convenience	0.528	0.527	-0.002	0.406	0.645
Integrative -> Ease of use	0.536	0.533	-0.003	0.417	0.649
Usefulness -> Attitude towards use	0.437	0.436	-0.001	0.33	0.534
Usefulness -> Cognitive Usefulness -> Continuance use	0.467	0.466	-0.001	0.352	0.574
Usefulness -> Convenience	0.396	0.395	-0.001	0.291	0.493
Usefulness -> Ease of use	0.339	0.338	-0.001	0.229	0.44
Usefulness -> Hedonic	0.324	0.322	-0.002	0.212	0.428
Usefulness -> Integrative	0.49	0.488	-0.002	0.385	0.585
Usefulness -> Attitude towards use	0.861	0.859	-0.001	0.8	0.907
Usefulness -> Cognitive Usefulness -> Continuance use	0.484	0.483	-0.001	0.355	0.599
Usefulness -> Convenience	0.747	0.744	-0.002	0.656	0.819
Usefulness -> Ease of use	0.909	0.908	-0.001	0.86	0.946
Usefulness -> Hedonic	0.833	0.831	-0.002	0.763	0.888
Usefulness -> Integrative	0.514	0.513	-0.001	0.387	0.631
Usefulness -> Integrative	0.374	0.373	-0.002	0.269	0.472

5.4 Structural Model Assessment

After a positive validation of the measurement model, the next step is to test the structural model (Hair *et al.*, 2019; Urbach and Ahlemann, 2010). Five essential steps were used to evaluate the structural model as suggested by (Hair *et al.*, 2019; Urbach and Ahlemann, 2010). These steps are discussed in the subsections below:

5.4.1 Assessing Structural Model for Multicollinearity Issues

As part of the structural model evaluation, the first step is to examine multicollinearity. Multicollinearity occurs when there is a combination among predictors in a multiple regression analysis (O'Brien, 2007). Multicollinearity was assessed by analyzing the variance inflation factor (VIF) for each independent construct. A minimum threshold of 5 or lower is needed to avoid issues of collinearity (Hair, Ringle, and Sarstedt, 2011). If this threshold is met, it means that the construct under consideration is almost a perfect linear combination of independent variables already in the equation (Hair *et al.*, 2011; Hair *et al.*, 2016; Mansfield *et al.*, 1982). From Table 5.7, all VIF values are below 5, indicating that there are no issues with collinearity in this study.

Table 5. 7 Multicollinearity Statistics (Inner VIF)

	Attitude towards use	Cogniti ve	Continua nce use	Conven ience	Ease of use	Hedoni c	Integrative	Useful ness
Attitude towards use			1.000					
Cognitive Continuanc e use	1.903							
Convenienc e	3.866							
Ease of use	2.992							
Hedonic	2.056							
Integrative	1.287							
Usefulness	3.524							

Source: SmartPLS

5.4.2 Assessing Structural Model for the Significance of Path Coefficient

After examining collinearity, it is imperative to evaluate the significance of the path coefficient between the model's latent variables (Urbach and Ahlemann, 2010). To do this, we run a bootstrapping algorithm in SmartPLS using a large number of 5000 subsamples while using a 0.1(10%) two-tailed distribution. Bootstrapping is a “non-parametric resampling procedure that assesses the variability of a statistic by examining the variability of the sample data rather than using parametric assumptions to assess the precision of the estimates” (Streukens and Leroi-Werelds, 2016, p. 2). Because PLS-SEM does not show that data is normally distributed, it is necessary to run a non-parametric test using SmartPLS (Hair *et al.*, 2016). The bootstrapping method produces t-statistics for the analysis of the direct and indirect effects (Hair *et al.*, 2016). The findings are shown in Table 5.9. Since a 95% confidence interval is assumed, a minimum critical value of 1.65 as ideal for a significance level of 10% (two-tailed) (Hair *et al.*, 2011). From Table 5.9, it can be seen that, out of 7 hypotheses, four are supported, that is, these hypotheses have a critical t-value of 1.65 and above. The same results are also shown in Figure 5.3.

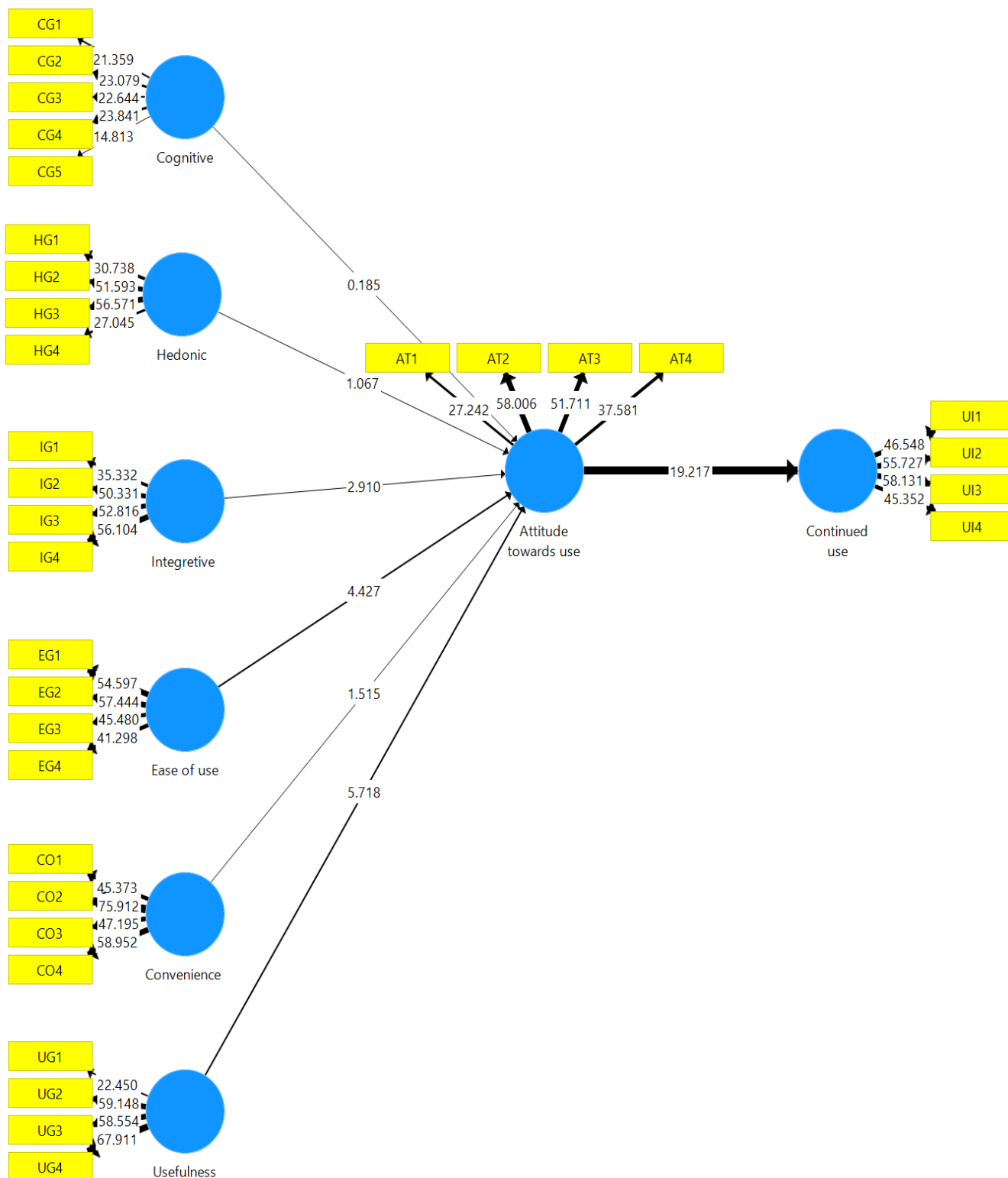


Figure 5. 2 Hypothesis Testing for Direct Effect

Table 5. 8 Direct relationship for Hypothesis Testing

Hypo thesis	Relationship	Std beta	Std error	t-value	Inference	95% CI LL	95% CI UL
H1	Cognitive -> Attitude towards use	-0.007	0.006	0.185	Not supported	-0.103	0.091
H2	Hedonic -> Attitude towards use	0.061	0.057	1.067	Not supported	-0.032	0.155
H3	Integrative -> Attitude towards use	0.115	0.039	2.91**	Supported	0.050	0.180
H4	Ease of use -> Attitude towards use	0.238	0.055	4.427**	Supported	0.147	0.327
H5	Convenience -> Attitude towards use	0.098	0.064	1.515	Not supported	-0.005	0.203
H6	Usefulness -> Attitude towards use	0.440	0.077	5.718**	Supported	0.313	0.565
H7	Attitude towards use -> Continuance use	0.746	0.039	19.217**	Supported	0.679	0.807

5.4.3 Assessing the Goodness of Fit

Following an evaluation of the structural model for the significance of the path coefficient, an evaluation was conducted to determine the model's goodness of fit (GOF). The assessment of this indicates whether the model is well-fitted or ill-fitted (Henseler *et al.*, 2015). The GOF test also helps the researcher to identify misspecifications of the measurement and structural model (Dijkstra and Henseler, 2015). The R square determination coefficient (R^2) is the most widely used criteria (Hair *et al.*, 2019). R^2 measures the model's explanatory power. It represents the combined effects of the exogenous latent variables on the endogenous latent variable (Hair, Sarstedt, Hopkins, and Kuppelwieser, 2014). R^2 varies from 0 to 1 with higher explanatory power values. As a guide, R^2 values of 0.25, 0.50 and 0.75 can be termed as weak, moderate and substantial respectively (Hair *et al.*, 2011; Henseler *et al.*, 2009). In IS research, Chin (1998) considers R^2 values of 0.190 and lower as weak, values around 0.333 as average and approximate values of 0.670 as substantial. From Table 5.9, the R^2 of the model is 0.649 (which is considered substantial

in IS research). It means that the combined exogenous latent variables account for 67% of the endogenous factor variations. (Hair *et al.*, 2019; Urbach and Ahlemann, 2010).

Table 5. 9 R Squared

Dependent Constructs	R Square	R Square Adjusted
Attitude towards use	0.649	0.643
Continuance use	0.556	0.555

In PLS-SEM, Henseler, Hubona, and Ray (2016) advocated for one of the following criteria to be used in determining a model's GOF. They are the standardized root mean squared residual (SRMR), the unweighted least squares discrepancy (d_{lus}) and the geodesic discrepancy (d_G). Each of these three can be used to evaluate a model's GOF. In this study, the SRMR was used. This is because SRMR has been widely used and accepted by considerable studies as an appropriate measure for assessing the goodness of fit in PLS-SEM (Bailey *et al.*, 2017; C. S. Lee and Ma, 2012; Pappas, 2017). With this criterion, the rule of thumb indicates that the lower the SRMR the better the model's fit. A perfect fit is realized when SRMR is zero. However, an SRMR value of 0.08 or lower is acceptable or advisable (Henseler *et al.*, 2016). An SRMR value of above 0.08 indicates the absence of fit. From Table 5.10, the estimated SRMR value is 0.071 which is less than the threshold of 0.08. This, therefore, indicates that the model is well fit and there are no measurement or structural model misspecifications.

Table 5. 10 Goodness of Fit (SRMR criteria)

	Original Sample (O)	Sample Mean (M)	95%	99%
Saturated Model	0.059	0.038	0.044	0.048
Estimated Model	0.071	0.043	0.051	0.057

5.4.4 Assessing the Effect Size

After evaluating the structural model's GOF, the next step required is to assess the effect size of each path in the SEM through Cohen's f^2 (Cohen 1988). The effect sizes measure if an independent construct has a significant impact on the dependent construct (Cohen, 1988). That is, it measures the degree of significance of the dependent construct on the independent construct (Urbach and Ahlemann, 2010). Using SmartPLS, the f^2 values are arrived at when the PLS algorithm is run. The f^2 values are presented in Table 5.12. The f^2 values between 0.020 and 0.150, between 0.150 and 0.350 and above 0.350 show that the exogenous latent variable or the independent construct has a small, medium or large effect on the dependent construct (Chin, 1998; Cohen, 1988; Gefen *et al.*, 2000). Therefore, from Table 5.11, the independent constructs such as cognitive, convenience, ease of use, hedonic and integrative are regarded to have a small effect on the dependent construct which is, attitude towards use. In addition, usefulness as an independent construct has a medium effect on the dependent variable - Attitude towards use. Attitude towards use is termed to have a large effect on continuance use intention.

Table 5. 11 f-square

Constructs	Attitude towards use	Continuance use
Attitude towards use		1.253
Cognitive	0.003	
Continuance use		
Convenience	0.008	
Ease of use	0.058	
Hedonic	0.008	
Integrative	0.030	
Usefulness	0.155	

5.4.5 Assessing the Predictive Relevance

Besides analyzing the effect size of each independent construct on the dependent construct, it is necessary to determine the predictive relevance of the structural model (q^2). The predictive relevance of each endogenous latent variable postulates that the model must be able to adequately predict each endogenous latent construct's indicators (Geisser, 1975; Stone, 1974). q^2 is determined by initiating a non-parametric Stone-Geisser test (Geisser, 1975; Stone, 1974). A blindfolding procedure was run in SmartPLS to produce estimates of residual variances by consistently assuming that a particular number of cases were missing from the sample. That is, after the blindfolding procedure was first run, the predictive relevance included was recorded. After this was done, all independent constructs were removed one after the other and the blindfolding procedure initiated to derive at Q^2 excluded. In the blindfolding window, an omission distance of 5-10 is recommended (Hair, Sarstedt, Ringle, and Mena, 2012). The formula $q^2 = (Q^2_{included} - Q^2_{excluded}) / (1 - Q^2_{included})$ (Henseler et al., 2009) was used to compute the predictive relevance of each independent construct on the dependent construct. The results are presented in Table 5.12. As a rule, q^2 values above 0, 0.25 and 0.50 indicate the path model's small, medium and large q^2 (Hair et al., 2019).

Table 5. 12 q square (q^2)

Constructs	Q^2 included	Q^2 excluded	q^2
Cognitive	0.442	0.442	0
Hedonic	0.442	0.441	0.001792
Integrative	0.442	0.435	0.012545
Ease of Use	0.442	0.43	0.021505
Convenience	0.442	0.441	0.001792
Usefulness	0.442	0.406	0.064516

5.5 Moderating Variables

As part of the objectives of this study, the effect of the moderating factors on the relationship between the dependent constructs (i.e, Cognitive, Hedonic, Integrative, Ease of use, Convenience and Usefulness Gratifications) and the independent construct (Attitude towards use) were examined. These moderating factors, indicated in the model, are income and education.

5.5.1 Income

A multi-group analysis was conducted using SmartPLS to assess the moderating impact of income on the relationship between the independent constructs and the dependent construct. Multi-group analysis precisely lets the researcher analyze the discrepancies between the same models predicted for different groups of respondents. The purpose of conducting a multi-group analysis is to determine whether there are statistically significant differences between the different group models (Hair *et al.*, 2016). This approach gives the researcher results for the difference between groups through *t*-values and *p*-values. Results from the multi-group analysis are presented in Table 5.13. However, when a multi-group analysis was run on the different levels of income in Table 5.1, an error occurred as variables such as GHc 3001-GHc 4000 and above GHc 4001 recorded low samples of 15 and 21 respectively. Hence, this led to dividing the groups of income into two levels, (that is, individuals who earn from GHc 0 to GHc 2,000 and individuals who earn above GHc 2000). Results from the multi-group analysis are presented in Table 5.13. The rule of thumb indicates that the *t*-values should be 1.65 (10% two-tailed) and above (Hair *et al.*, 2011) before it can be concluded that a moderator significantly moderates the relationship between two constructs.

Table 5. 13 Multi-group analysis results of income

	Path Coefficients Original (0-2000)	Path Coefficients Original (above 2001)	t-Values (0-2000)	t-Values (above 2001)	95%CI LL (0-2000)	95% CI UL (0-2000)	95%CI LL (above 2001)	95% CI UL (above 2001)
Cognitive -> Attitude towards use	-0.044	-0.014	0.653	0.091	-0.158	0.063	-0.29	0.204
Ease of use -> Attitude towards use	0.253	0.191	4.24**	1.367	0.159	0.353	-0.048	0.409
Usefulness -> Attitude towards use	0.427	0.457	5.014**	2.651**	0.273	0.555	0.200	0.772

5.5.2 Education

Similar to income, education had to be divided into two groups in order to initiate a multi-group analysis. When a multi-group analysis was run on the different levels of education in Table 5.1, an error occurred as variables such as SHS and below and Ph.D. recorded low samples of 12 and 10 respectively. Hence, this led to dividing the groups of education into two levels, (that is, individuals who have a degree as highest qualification and individuals who possess a certificate greater than the bachelor's degree). The multi-group analysis, carried out, yielded the results in 5.14. the t-values of 1.65 and above (10% two-tailed) indicate that the moderator significantly moderates the relationship between the variables or constructs concerned (Hair *et al.*, 2011).

Table 5. 14 Multi-group analysis results for education

	Path Coefficients Original (Degree and below)	Path Coefficients Original (Masters and Ph.D.)	t-Values (Degree and below)	t-Values (Masters and Ph.D.)	95%CI LL (Degree and below)	95% CI UL (Degree and below)	95%CI LL (Masters and Ph.D.)	95% CI UL (Masters and Ph.D.)
Cognitive -> Attitude towards use	-0.005	-0.033	0.059	0.279	-0.132	0.121	-0.247	0.137
Ease of use -> Attitude towards use	0.285	0.056	4.52**	0.586	0.190	0.393	-0.107	0.207
Integrative -> Attitude towards use	0.095	0.126	1.973**	2.386**	0.017	0.172	0.041	0.215
Usefulness -> Attitude towards use	0.304	0.65	3.042**	7.43**	0.137	0.463	0.494	0.778

5.6 Chapter Summary

This chapter provided an analysis of data gathered in Ghana on the use of mobile payments. Analysis of the collected data helped to meet this study's research goals. The study identified the nature of mobile payments in Ghana, the gratifications obtained from the use of mobile payments, and the effect of the gratifications obtained on attitude towards use. The impact of attitude to use on continuance use intention was revealed. This chapter also revealed the impact of moderators, i.e. income and education on the relationship between independent constructs and the dependent construct.

CHAPTER SIX

DISCUSSION OF RESULTS

6.1 Introduction

The previous chapter documented the empirical results of this study's objectives. A summary of the findings discussed in the previous chapter continues on from this section. The chapter is split into two sub-sections. The first part deals with the influence of Cognitive, Hedonic, Integrative, Ease of use, Convenience and Usefulness Gratifications on Attitude towards use. In addition, the influence of Attitude towards use on Continuance use intention is discussed. The second and final part deals with the effect moderators have on the relationship between independent constructs and dependent constructs.

6.2 Gratification of Mobile Payment Users

The study's objective is to identify and examine the gratifications driving the attitude and continuous use of mobile payments in Ghana. The study further explored the effect of income and education mediating between gratification and attitude towards using mobile payment services. This aspect has been largely ignored by extant research. Filling this gap, this study empirically tested the Uses and Gratification model by relying on data collected from 361 individuals who use mobile money and mobile banking services in Ghana. Of the seven hypotheses formulated in this study, four (4) were supported and three (3) were otherwise. Specifically, Integrative, Ease of use and Usefulness gratifications were discovered to significantly influence the attitude towards mobile payments use. In addition, Attitude towards mobile payments use was found to

significantly influence continuance use intention of mobile payments. The outcome of the supported hypothesis can be seen in Table 5.8.

From the analysis of the results, it was revealed that the hypothesis of Cognitive gratification, being positively associated with the attitude towards use, was not supported. This indicates that mobile payments do not provide users with the right amount of information they need to carry out their transactions. Furthermore, users do not think mobile payments are less costly than other traditional means of payments. Mobile payments are embedded with high costs of transactions and therefore user's cognitive gratification negatively influences their attitude towards mobile payment use. However, findings from other studies conducted on mobile payments space have largely revealed that cognitive gratification positively influences attitude towards mobile payment use (Ozturk *et al.*, 2017). For instance, Ozturk *et al.* (2017) carried out a study in the US to analyze the factors that affect customers' intention to use mobile payments. The study relied on the valence theory to examine the impact of functional benefits (utilitarian value and convenience) and negative valence (perceive risk and privacy concern) on users' intention to use mobile payments. Findings from their study suggest that functional benefits and privacy concerns significantly influence an individual's intention or attitude to use mobile payments. Extant studies have largely considered mobile payments as offering a functional value and as such, it is adopted by users to carry out functional tasks (Chang *et al.*, 2016; Ozturk *et al.*, 2017). Notwithstanding, these studies were conducted in developed countries and findings cannot be generalized to the developing country context (Ghana) as culture, literacy level, legislation, and technological infrastructure differ. This study, therefore, adds to literature with its current finding.

As part of the hypothesis stated, hedonic gratification, being positively associated with the attitude towards use, was not supported. This means that users of mobile payments do not obtain any form of enjoyment from using this service. As such, it leads to a negative influence on their attitude towards mobile payment use. This area has largely been ignored by research in the mobile payment domain. As stated earlier, extant research considers mobile payment as offering a functional value or benefits (Utilitarian) and not a non-functional benefit (Chang *et al.*, 2016; de Kerviler, Demoulin, and Zidda, 2016; Ozturk *et al.*, 2017). As such, individuals adopt and use mobile payment to undertake functional tasks. Results from this study also showed that hedonic gratification in the form of resting, enjoyment and spending time (Batra and Ahtola, 1991; Chiang 2013; Nambisan and Baron, 2007) did not influence users' attitudes towards mobile payment use.

In addition, the analysis of findings revealed that the hypothesis of integrative gratification, being positively associated with the attitude towards use, was supported. This indicates that, when individuals use mobile payments, they feel they belong to a particular class of people. Therefore, they are able to blend well with others who have/are using mobile payments. Nambisan and Baron (2007) define Integrative gratification relates to the gratification of making or creating identity, increasing user values and creating a sense of belongingness by using a particular media (Nambisan and Baron, 2007). Extant mobile payment research has largely ignored the influence of the integrative construct on users' attitudes towards mobile payment use. However, findings from research on other IS domains have revealed that integrative gratification positively influences attitude towards use. This includes the study of Ha, Kim, Libaque-Saenz, Chang, and Park (2015) carried out to identify the gratifications driving mobile social networking sites (SNS) use in Korea.

Findings from their study revealed that integrative gratification positively influences users' attitudes towards SNS use.

Davis (1989, p.320) defined *ease of use* as “the degree to which a person believes that using a particular system would be free from effort”. As part of the hypothesis, ease of use gratification being positively associated with the attitude towards use was supported. Individuals who use mobile payments enjoy the ease that comes with using the service. As such, they continue to use it more. This is affirmed by other studies carried out in the mobile payment research space (Chuang *et al.*, 2016; Mun *et al.*, 2017). For example, Mun *et al.* (2017), in their study of investigating the critical factors that influence millennials' use of mobile payment services in Malaysia, found that *ease of use* was a critical factor influencing millennials' attitudes towards mobile payment use. Similarly, Chuang *et al.* (2016) conducted a study to understand consumers' behavioral intentions in using Mobile payment service in Taiwan. Findings from their studies revealed that, once Mobile payment service is easy to use, consumers will patronize it more and more. Thus, *ease of use* positively affects attitude towards mobile payment use.

Dewan and Chen (2005) referred to convenience as a possible gain that mobile payments deliver to users as a result of its innovative and technological features. As stated in the hypothesis, convenience gratification, being positively associated with the attitude towards use, was not supported. This indicates that individuals who use mobile payments do not obtain any form of convenience from the service. Therefore, their attitude towards use is not influenced by the convenience that comes with using mobile payments. This finding goes contrary to the findings of other studies conducted on mobile payment (Ozturk *et al.*, 2017; Ryu, 2018; Yonghee *et al.*, 2016).

However, these studies were conducted in developed countries, and findings cannot be generalized to the developing country context (Ghana) as culture, literacy level, legislation and technological infrastructure differ.

Davis (1989) defined perceived usefulness as “the degree to which a person believes that using a particular system would enhance his/her job performance”. The hypothesis of usefulness gratification, being positively associated with the attitude towards mobile payment use, was supported. People who use mobile payments comprehend that the service aids them to better undertake financial transactions. Therefore, they obtain the benefit of how useful mobile payments are. This positively influences their attitude towards mobile payment use which in turn leads to their continuance use of mobile payments. This is supported by similar studies conducted in the domain of mobile payment research (Chuang *et al.*, 2016; Mun *et al.*, 2017; Yonghee *et al.*, 2016). For example, findings from the study of Chuang *et al.* (2016) conducted on users' behavioral intentions in using mobile payment service in Taiwan revealed that usefulness positively influences users' attitudes towards mobile payment use. That is, when users perceive mobile payments as being able to help them carry out the transactions, their attitude towards its use is enhanced. Similarly, findings from this study revealed that, when users feel gratified in terms of how useful mobile payments are, their attitude towards its use improves.

Ajzen (2001) refers to *attitude* as the summed rating of the psychological state that captures dimensions such as good or bad, harmful or beneficial as well as pleasant and unpleasant. The theory of reasoned action (TRA) that enables researchers to predict how people will behave based on their pre-existing attitudes and behavioral intentions is made up of constructs such as attitude,

intention, and behavior. Attitude makes up intention and intention in turn leads or results to behavior (Fishbein and Ajzen, 1976). The hypothesis of attitude towards mobile payment use, being positively associated with continuance use intention, was supported. A considerable amount of mobile payment research has largely focused on the effect of attitude on actual use behavior (Chuang *et al.*, 2016; Ozturk *et al.*, 2017). This finding, therefore, sheds light on a different perspective, that is, when users obtain some gratifications from using mobile payment, their attitude towards use is enhanced which intends positively influences their continuance use of the service or technology.

6.2 Effect of Moderators of the Constructs

This section explores the influence of moderators for this study on the relationships between the independent constructs and the dependent constructs. This study adopted two moderators, that is, income and education. Extant research in the mobile payment domain has called for research to examine the effect of these moderators on the relationship between the independent constructs and the dependent constructs (Bailey *et al.*, 2017; Ozturk *et al.*, 2017; Yonghee *et al.*, 2016). In view of this, the discussion under this section focuses on the effects of these moderators on the U&G theory.

Income was divided into two groups, that is, individuals who from Ghc 0 to GHc 2,000 and individuals who earned from more than GHc 200. The division was done in order to enable the researcher to easily undertake a multi-group analysis. Results from the multi-group analysis are presented in Table 5.13. Firstly, the hypothesis of income significantly moderating the relationship between cognitive gratification and attitude towards mobile payment use was not supported for

both groups of income. A person's level of income had no influence on the relationship between their cognitive gratification and attitude towards mobile payment use. The results obtained can be explained based on the fact that users of all income ranges did not obtain any form of cognitive gratification from using mobile payments. Therefore, income will not moderate the relationship between a person's cognitive gratification and attitude towards mobile payment use.

Furthermore, the hypothesis of income significantly moderates the relationship between *ease of use* gratification and attitude towards mobile payment use was supported for individuals who earned between GHc 0 and GHc 2000. However, it was not supported for individuals who earned above GHc 2000. That is, users who earned between GHc 0 and GHc 2000 had their income influencing the relationship between their ease of use gratification and attitude towards Mobile payment. Users who earned above GHc 2000 did not experience that. This implies that users who earned low income (i.e, GHc 0 and GHc 2000) are mostly concerned about the ease that comes with using mobile payments due to their low purchasing power. Higher-income groups are mainly not concerned about the ease that comes with mobile payments as they have the ability to withstand the possible financial loss.

Finally, the hypothesis of income significantly moderating the relationship between usefulness gratification and attitude towards mobile payment use was supported for both groups of income. That is, an individual's income influenced the relationship between his or her usefulness gratification and attitude towards mobile payment use. This result indicates that both groups of income (i.e, between GHc 0 and GHc 2000 and above 2000) enjoy the usefulness that mobile

payments offer them. With mobile payments, users are able to carry out transactions from their mobile devices. Therefore, no matter their income, they patronize mobile payments.

Similar to income, education had to be divided into two groups in order to initiate a multi-group analysis. Education was therefore divided into two halves, that is, individuals who have a degree and below, and individuals who possess a master's degree and Ph.D. The multi-group analysis was carried out and the results are presented in Table 5.13.

Firstly, the hypothesis of education significantly moderating the relationship between cognitive gratification and attitude towards mobile payment use was not supported for both groups' education. That is, an individual's level of education did not influence the relationship between his or her cognitive gratification and attitude towards mobile payment use. This can be mainly attributed to the fact that all respondents no matter their level of education did not obtain any form of cognitive gratification from using mobile payments. Therefore, education will not moderate the relationship between a person's cognitive gratification and attitude towards mobile payment use.

Secondly, the hypothesis of education significantly moderating the relationship between integrative gratification and attitude towards mobile payment use was supported for both groups' education. That is, an individual's level of education influences the relationship between integrative gratification and attitude towards mobile payment use. This implies that the higher a person climbs the academic ladder, the more he or she wants to create an identity of belonging to a particular class of people. Therefore, using mobile payments will enable him or her fit well in society and respected by peers and family.

In addition, the hypothesis of education significantly moderating the relationship between *ease of use* gratification and attitude towards mobile payment use was supported for individuals whose level of education stood at a degree and below. However, it was not supported for individuals who had a master's degree or Ph.D. That is, individuals whose level of education stood at a degree and below had their level of education influencing the relationship between their ease of use gratification and attitude towards mobile payment. Individuals whose level of education stood a master's degree or Ph.D. did not experience that.

Finally, the hypothesis of education significantly moderating the relationship between usefulness gratification and attitude towards mobile payment use was supported for both groups' education. That is, an individual's level of education influenced the relationship between his or her usefulness gratification and attitude towards mobile payment use. Thus, when an individual is educated, he or she is made aware of the essence of adopting and using technological innovations (i.e, mobile payments). Therefore, he or she adopts mobile payments and uses it to be gratified of the usefulness that comes along with using it.

6.4 Chapter Summary

This chapter focused on discussions regarding the relationship that exists between the proposed hypotheses and its influence on mobile payment continuance use intention. The aim of this assessment was to unearth the degree to which the stated hypothesis influenced individuals' continuance use intention of mobile payment. In addition, the influence of moderators (i.e, income and education) on the model was assessed.

CHAPTER SEVEN

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

7.1 Introduction

The previous chapter concentrated on discussing the analysis of empirical findings and dealt with the research questions in relation to literature reviewed. Therefore, this chapter focuses on concluding the study by providing a summary of the study's key findings based on the objectives and discussing the implications of the research findings on research, policy, and practice.

7.1 General Conclusion

This study investigated the Effect of Gratification on User Attitude and Continuous Use of Mobile Payment Technologies in a Developing Country (i.e, Ghana). In order to address the objectives of this study in Section 1.3, the study leaned on the foundations of the Uses and Gratifications theory to identify both functional and non-functional benefits/gratifications derived from mobile payment use. Furthermore, the study examined how these gratifications obtained influence attitude towards use which in turn influence continuance use behavior of individuals in Ghana. The Uses and Gratifications theory was chosen among other theories such as TAM and UTAUT because it enabled the researcher to understand why and how individuals actively seek mobile payments to satisfy their specific needs. The study adopted a questionnaire to collect data from respondents or individuals in Ghana. Constructs used for this study were validated by monitoring indicator loadings (Hair *et al.*, 2019) whilst hypothesis was tested by assessing the path coefficient for significance (Hair *et al.*, 2019; Urbach and Ahlemann, 2010).

7.2 Answers to the Research questions

The results of this study are presented on the basis of the research objectives. First, the nature of mobile payment in Ghana. Second, findings on the gratifications obtained from mobile payment use. Finally, the influence of gratifications obtained on attitude towards use which in turn influences continuous use intention. Details of these are given in the three subsections below.

7.2.1 Nature of Mobile Payment in Ghana

Literature reviewed on the nature of mobile payments in Ghana revealed the existence of three mobile payment services. That is Mobile Money, Mobile Banking and Internet Banking (Bank of Ghana, 2018). This study, however, focused on mobile money and mobile banking because they both operate on similar technologies, which is USSD code. Similarly, both operate without internet connectivity. Data collected for this study revealed that mobile money was largely used among individuals in Ghana. This is largely attributed to the fact that mobile money is run by the three big telecommunication companies in Ghana. That is Mobile Telephone Network (MTN), Vodafone and AirtelTigo (Bank of Ghana, 2018). Therefore, individuals who buy and register the Subscriber Identity Module (SIM) of any of these companies are given the opportunity to register for mobile money services.

The Mobile Money process is initiated when a user wants to send or withdraw cash. To send cash, the user dials the USSD code that gives him or her several options. Amongst these options are “send cash”. The user inputs the phone number of the person he or she is sending money to. A pop-up message opens to asking the user of the amount he or she wants to send. Once the amount is specified, the name of the receiver pops up and the sender is required to input his or her unique

Postal Index number (PIN) code in order to complete the transaction. To withdraw cash on Mobile Money, the user is required to visit a Mobile Money agent. The user is required to dial a USSD code and select the option that reads “allow cash-out”. When this option is selected, the Mobile Money agents similarly dial a USSD code and takes the phone number of the user in order to initiate the transaction. The user informs the Mobile Money agent on the amount he or she wishes to withdraw. After this, a message is sent to the user detailing the amount to be withdrawn and the name of the agent who initiated the transaction. The user is then required to input his or her unique PIN code in order to complete the transaction and receive cash.

7.2.2. Gratifications Obtained from Mobile payment use

Literature reviewed revealed six gratifications from Mobile payment use. They were Cognitive gratification, Hedonic gratification, Integrative gratification, Ease of use gratification, Convenience gratification and Usefulness gratification. Although individuals or users obtained six gratifications from using mobile payment, not all these gratifications influenced their attitude towards use. Three of the gratifications obtained significantly influence users’ attitudes towards use. That is, Integrative, Ease of use and Usefulness gratification. Attitude towards use was found to influence the continuance use behavior of individuals.

7.3 Mapping out Research Objectives with Research Findings and Contributions.

Research Purpose: This study aimed to identify and examine the effect of gratifications on user attitude and continuance use of mobile payments in Ghana. Table 7.1 gives a brief summary of the findings of the study in line with the study’s objectives. Furthermore, the contributions, implications, and recommendations of the study are outlined.

Table 7. 1 Mapping Research Objectives to Findings and Contributions

Research Objectives	Research Findings	Supporting Literature	Contributions, Implications, and Recommendations
To investigate the nature of mobile payments in Ghana	<p>The advent of mobile payments has enabled individuals to undertake transactions from their mobile devices from any part of the world and at their own convenience. On the nature of mobile payments in Ghana, literature revealed that</p> <ul style="list-style-type: none"> • Three mobile payment services are currently recognized by the Central Bank of Ghana. They are Mobile Money, Mobile Banking and Internet Banking. • Mobile Money (MoMo) is carried out by three telecommunication companies: <i>MTN Mobile Money</i>, <i>Vodafone Cash</i>, and <i>AirtelTigo Cash</i>. These service providers provide the platform for their subscribers to register and undertake MoMo transactions at their own convenience. MoMo operates using USSD and thus does not require internet connectivity to function. • Mobile Banking and Internet Banking are carried out by financial institutions (i.e., Banks). Whilst Mobile Banking operates using a USSD, Internet Banking operates using internet connectivity. 	Bank of Ghana (2018)	<ul style="list-style-type: none"> • This study further adds to the existing knowledge regarding mobile payments in developing countries especially Ghana. • Furthermore, this study responds to the gaps identified in literature considering that few studies have been carried out from a developing country context.
To investigate user gratifications on the use of mobile payment.	<ul style="list-style-type: none"> • Literature reviewed revealed six user gratifications on the use of mobile payments. They are Cognitive, Hedonic, Integrative, Ease of Use, Convenience, and Usefulness Gratifications. 	Batra and Ahtola (1991), Ha <i>et al.</i> (2015), Chang <i>et al.</i> (2016), Chuang <i>et al.</i> (2016) Kim, Park, Choi, and Yeon (2015), Mun <i>et al.</i>	<ul style="list-style-type: none"> • Arguably, this is the first study to be carried out on the Effect of Gratification on User Attitude and Continuance Use of Mobile Payment Technologies. • Furthermore, extant literature has largely focused only on the

		(2017), Yonghee <i>et al.</i> (2016)	functional aspects of mobile payments. This study combines both the functional and non-functional aspects of mobile payments into one model in order to study user behavior. This study, therefore, adds to the limited literature in the area of mobile payments.
To examine the effect of gratifications on user attitude towards mobile payment and continuance use intention	<p>From the analysis of the findings, four hypotheses were supported and three were not supported.</p> <ul style="list-style-type: none"> • First, the hypothesis of Integrative Gratification being positively associated with Attitude towards mobile payment use was supported. • Second, the hypothesis of Ease of use Gratification being positively associated with Attitude towards mobile payment use was supported. • Third, the hypothesis of Usefulness Gratification being positively associated with Attitude towards mobile payment use was supported. • Finally, the hypothesis of Attitude towards mobile payment use being positively associated with Continuance use intention was supported. • Nevertheless, the hypothesis of Cognitive, Hedonic and Convenience Gratifications being positively associated with Attitude towards use were not supported. 	<p>Chuang, Liu, and Kao (2016), Mun, Khalid, and Nadarajah (2017).</p> <p>Chuang, Liu, and Kao (2016), Mun, Khalid, and Nadarajah (2017), Yonghee, Young-Ju, Jeongil, and Jiyoung (2016).</p>	<ul style="list-style-type: none"> • This study relied on the theory of Uses and Gratifications to analyze the gratifications that drive user attitude and continuance use of mobile payments. Arguably, this is the first study to follow the concept of Uses and Gratifications in mobile payment research. Previous research has largely adopted theories such as TAM, UTAUT, and DOI. Therefore, this study adds to literature by giving a different perspective on user behavior using the Uses and Gratifications theory. • Furthermore, extant literature largely focused on the functional benefits derived from mobile payment use. This study focused on both functional and non-functional benefits driving the attitude and continuance use of mobile payments. • It is important to indicate the implications of the results of this study on the mobile payment sector. Findings revealed that Integrative gratification, Ease of use gratification and Usefulness gratification

			<p>significantly influence users' attitudes towards mobile payment use. As a result, mobile payment service providers need to ensure that, services provided continuously enable users to enjoy these forms of gratification (that is, Integrative gratification, Ease of use gratification and Usefulness gratification). Similarly, results indicated that Hedonic, Convenience, and Cognitive gratifications did not influence users' attitudes towards mobile payment use. This study, therefore, admonishes mobile service providers to integrate mobile payment with features of these gratifications so that they can be enjoyed by individuals.</p> <ul style="list-style-type: none"> • With regard to policy, creating a favorable Information Communication and Technology (ICT) environment will positively influence users to adopt and use Mobile Payment services. An enabling ICT environment in the form of ICT access and infrastructure will equip individuals with the necessary tools to conduct mobile payment. Likewise, an enabling environment in the form of ICT laws and policies will ensure that the financial information of the user is protected and secured.
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Source: Author's construction

7.4 Research Contributions and Implications

7.4.1 Implication to Research

Previous studies on the adoption and use of mobile payments described this field as promising. As such, they have called for future research to be carried out in order to unearth new findings that can add to literature, especially theories. With this advocacy, this study was carried out to identify and examine the gratifications driving the attitude and continuous use of mobile payments in Ghana. This has largely been ignored by previous research. Similarly, the moderating effect of variables such as income and education on the relationship between gratifications obtained and continuance use intention has largely been ignored by previous research. Arguably, it is the first research on gratifications and the continuous use of mobile payments. Therefore, this study adds to the existing literature in this area of research on mobile payment.

In addition, this study relied on the foundations of the theory of Uses and Gratifications to analyze the gratifications that drive the continued use of mobile payment. Arguably, this is the first study to follow the concept of Uses and Gratifications in mobile payment research. Previous research have largely adopted theories such as TAM, UTAUT, and DOI. Therefore, this study adds to literature by giving a different perspective on user behavior using the Uses and Gratifications Theory. In addition, extant literature largely focused on the functional benefits derived from mobile payment use. This study focused on both functional and non-functional benefits driving the attitude and continuance use of mobile payments.

7.4.2 Implication for Practice and Policy

This study identified and examined gratifications obtained from the use of mobile payments. The study further examined the effect of gratifications obtained on users' attitudes towards use. Finally, the study examined how attitude towards use influences continuance use of mobile payments in Ghana. Thus, it is important to indicate the implications of the results of this study on the mobile payment sector. Findings revealed that Integrative gratification, Ease of use gratification and Usefulness gratification significantly influence users' attitudes towards mobile payment use. As a result, mobile payment service providers need to ensure that, services provided continuously enable users to enjoy these forms of gratification (that is, Integrative gratification, Ease of use gratification and Usefulness gratification). That is, when they enjoy these gratifications, they intend to patronize mobile Payment service more. Similarly, results indicated that Hedonic, Convenience, and Cognitive gratifications did not influence users' attitudes towards mobile payment use. This study, therefore, admonishes mobile service providers to integrate mobile payment with features of these gratifications so that they can be enjoyed by individuals.

With regard to policy, creating a favorable Information Communication and Technology (ICT) environment will positively influence users to adopt and use Mobile Payment services. An enabling ICT environment in the form of ICT access and infrastructure will equip individuals with the necessary tools to conduct mobile payment. Likewise, an enabling environment in the form of ICT laws and policies will ensure that the financial information about the user is protected and secured

7.5 Limitations and Recommendation for Future Research

This research has some limitations. First, the study was conducted in Ghana with respondents mainly based in the capital called Accra. Future research should be carried out in other areas or regions of the country so as to provide a holistic understanding of gratifications obtained and its influence on attitude towards use. Secondly, future studies may conduct comparative studies of two or more countries in order to determine whether gratification obtained from mobile payment use differs between countries. In addition, future studies may employ qualitative approaches so as to unearth users' interpretations of the gratifications they obtain from mobile payment use. Finally, since the study was conducted in Ghana the findings cannot be generalized to other parts of the world, but the findings share similarities with countries in the African Sub-regions.

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APPENDIX A: SAMPLE QUESTIONNAIRE



Dear Participant,

I am an MPhil candidate at the department of Operations and Management Information Systems of the University of Ghana Business School. I am conducting a study on the behavioral use and gratification of mobile payment systems in Ghana. I would be glad if you could take some few minutes out your busy schedule to fill this questionnaire. Please note that all information provided will be strictly confidential and will be used for academic purposes only.

Participation in the research activities is voluntary and you can choose to not answer any question or to leave the study at any time. You and your guardian will not be penalized in any way if you choose not to participate. There is no payment for participating in this research study. Data collected will be stripped off personal identifiers and will be replaced by codes.

For any questions please contact me through: mdalhassan001@st.ug.edu.gh or my supervisor: eakolog@ug.edu.gh

SURVEY QUESTIONS

PART A. Demographics (please tick [√]) where appropriate

1. Gender. Male [], Female []
2. Age. 15-25 [], 26-35 [], 36-45 [], 46-55 [], 56-65 [], above 65 []
3. What is your marital status? Single [], Married [], Divorced [], Widowed []
4. What is your level of education? SHS and below [] Diploma [], Degree [], Masters [], PhD [], None [], please specify others.....
5. What is your main occupation? Student [], Entrepreneur/Self-employed [], Public Service worker [], Private Service worker/NGO [], please specify others
6. Monthly income? 0- GHC1000 [], GHC1001- GHC2000 [], GHC2001- GHC3000 [], GHC3001- GHC4000 [], above 4001 []

PART B. Mobile payment systems usage section (please tick [√]) where appropriate

7. Do you use any mobile payment service? Yes [], No [].
8. If Yes, kindly specify the mobile payment service used? Mobile money [], Mobile banking [], Both []
9. How long have you used mobile payment systems? Below 4 years [], 5-10 years [], above 10 years []
10. How often do you use mobile payment systems in a month? 1-4times [], 5-10 times [], above 10 times []

PART C. Gratifications Obtained from mobile payment systems use (please tick [√]) where appropriate using a 5-point Likert as: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree

	Test Items	1	2	3	4	5
COGNITIVE						
CG1	Mobile payment systems help me better manage my money/cash					
CG2	Mobile payment systems provide information that helps me make better decisions					
CG3	Mobile payment systems provide me with information that helps me use the system better					
CG4	I save time when I use mobile payment systems					
CG5	Using mobile payment systems, I am able to undertake payments at a lower cost as compared to other traditional means of payment.					
HEDONIC						
HG1	I feel excited using mobile payment systems					
HG2	I get a joyful feeling when my transaction is successful					
HG3	Mobile payment systems help me to have some relaxing time					
HG4	I derive fun and pleasure from using mobile payment systems					
INTEGRATIVE						
IG1	It elevates my social status/reputation					
IG2	It enhances the strength of my affiliation					
IG3	It reinforces my credibility/ trustworthy					
IG4	It enhances my sense of belongingness					
EASE OF USE						
EG1	It is very easy to complete transactions using mobile payment systems					
EG2	Learning to use the mobile payment systems is easy for me					
EG3	I find mobile payment systems to be easy to use					
EG4	It is easier to follow the steps required when using mobile payment systems					
CONVENIENCE						
CO1	I can make payments very fast when I use mobile payment systems					
CO2	I can make payments anytime when I use mobile payment systems					

CO3	I can get access to financial services easily when I use mobile payment systems					
CO4	Mobile payment systems are convenient because my phone is usually with me					
USEFULNESS						
UG1	Using mobile payment systems is not limited by time and location which is helpful for me					
UG2	Mobile payment systems help me to make payments quickly					
UG3	Using mobile payment systems can make life more convenient					
UG4	It is easier for me to conduct transactions using mobile payment systems					
ATTITUDE						
AT1	It is very convenient to look up information using mobile payment systems anytime and anywhere					
AT2	I like the idea of using mobile payment systems.					
AT3	Overall my attitude towards mobile payment system is favorable.					
AT4	I am satisfied with the service provided by mobile payment systems providers					
CONTINUANCE USE						
CU1	I intend to use mobile payment systems on a regular basis					
CU2	I intend to continue using mobile payment systems rather than discontinue its use					
CU3	I intend to continue using mobile payment systems than use any alternative means (e.g., traditional means of payments)					
CU4	I think it is worth using mobile payment systems when it is available					

THANK YOU!!!