MAKERERE  **UNIVERSITY**

MAKERERE UNIVERSITY BUSINESS SCHOOL

DIGITAL FINANCIAL SERVICES ADOPTION, TRANSACTION COSTS, AND FINANCIAL INCLUSION: A CASE OF HOUSEHOLDS IN MASAKA DISTRICT

BY

ABOKE EMMANUEL EUGENE MBA (ACCOUNTING AND FINANCE) (Mak)

REG.NO: 2017/HD10/79U

STUDENT NUMBER: 207022253

Phone: +256-772-856-784, +256-756-632-402

Email: abokeemmanuel@gmail.com

A RESEARCH REPORT SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILMENT FOR THE AWARD OF MASTER OF BUSINESS ADMINISTRATION OF MAKERERE UNIVERSITY

DECEMBER 2021

PLAN A

DECLARATION

I Aboke Emmanuel Eugene declare that this thesis is my original work and has never been presented in any institution or University for any award.

Signed ..... **Date**..10/01/2022 .....

ABOKE EMMANUEL EUGENE

APPROVAL

This is to certify that this thesis has been submitted for examination with our approval as university supervisors.



.....

DR. RACHEL MANDRA KATOROOGO

SUPERVISOR

10/1/2022

.....

Date

.....

MR. AUGUSTINE MATOVU

SUPERVISOR

11/01/22

.....

Date

DEDICATION

I dedicate this research to Diana Akello. May your stay with us continue to inspire those who were touched by your presence. Rest in peace, my dear Sister.

ACKNOWLEDGEMENT

To God, the most merciful be glory and honor for His support throughout the entire study and my life wholly. I would also like to express my sincere gratitude and appreciation to my supervisors, Dr. Rachel Mindra Katoroogo and Mr. Augustine Matovu whose support, involvement, immense inspiration, tireless review of my work, ensuring a methodical approach to the study, and ensuring a very insightful critique on this work made this study a resounding success. Their thorough review of my research greatly enhanced my appreciation of digital financial services adoption, transaction costs, and financial inclusion. My sincere appreciation also goes to my MBA lecturers, colleagues, and staff of Makerere University Business School for the assistance extended to me in one way or the other. May the Almighty God bless you.

Last, I'm grateful to all my family members for their support and valuable suggestions throughout the study period. May God reward you abundantly.

TABLE OF CONTENTS

DECLARATION i
APPROVAL ii
DEDICATION iii
ACKNOWLEDGEMENT iv
TABLE OF CONTENTS v
LIST OF TABLES viii
LIST OF FIGURES ix
LIST OF APPENDICES x
CHAPTER ONE 1
INTRODUCTION 1
1.1 Background to the Study 1
1.3 Purpose of the Study 3
1.4 Objectives of the study 3
1.5 Research Questions 3
1.6 Scope of the Study 3
1.6.1 Subject Scope 3
1.6.2 Geographical Scope 3
1.6.3 Time Scope 4
1.7 Significance of the Study 4
1.8 Conceptual Framework 4
1.9 Explanation of the conceptual framework 5
CHAPTER TWO 6
LITERATURE REVIEW 6
2.0 Introduction 6
2.1. Theoretical Framework 6
2.1.1 Systems Theory of Financial Inclusion (STFI) 6
2.1.2 The Unified Theory of Acceptance and Usage of Technology (UTAUT) 7
2.1.3 Transaction Cost Economics (TCE) 8
2.2 Financial Inclusion (FI) 10
2.2.1 The concept of financial inclusion 10
2.2.2 Measures of financial inclusion (FI) 11
2.3 The concept of Digital Financial Services (DFSs) 11
2.3.1 Defining Digital Financial Services (DFSs) 12
2.3.2 Composition of Digital Financial Services (DFSs) 12
2.3.2.1 ATMs and Debit cards 12

2.3.2.2 Mobile Money (MM) 13
2.3.2.3 Internet Banking 13
2.3.2.4 Agency Banking 13
2.3.2.5 Fintech 13
2.3.3 Categories of digital financial services (DFSs) 14
2.3.4 Measures of digital financial services adoption 14
2.3.5 Factors affecting digital financial services adoption 15
2.4 Transaction Costs (TCs) 16
2.4.1 Components of transaction costs 17
2.4.2 Dimensions of transaction costs 17
2.5 The relationship between digital financial services (DFSs) adoption and financial inclusion (FI) 18
2.6 The relationship between transaction costs and financial Inclusion 18
2.7 The relationship between digital financial services (DFSs) and transaction costs (TCs) 20
2.8 The mediating effect of transaction costs on the relationship between digital financial services adoption and financial inclusion 21
CHAPTER THREE 23
METHODOLOGY 23
3.0 Introduction 23
3.1 Research Design 23
3.2 Population 23
3.4 Data Source 24
3.5 Data Collection Instruments 25
3.5.1 Questionnaires 25
3.6 Measurement of Variables 25
3.7 Validity and Reliability 27
3.7.1 Validity of Research Instruments 27
3.7.1.1 Content Validity 27
3.7.2 Reliability 28
3.8 Data Processing, Presentation, and Analysis 28
3.9 Ethical Considerations 29
3.10 Limitations of the Study 29
3.10.1 Period of the data collection 29
CHAPTER FOUR 31
PRESENTATION, ANALYSIS, AND INTERPRETATION OF FINDINGS 31
4.0 Introduction 31
4.1 Descriptive of the respondents 31

4.1.1 Gender of the respondents 32
4.1.2 Age of the respondents 32
4.1.3 Household monthly income 33
4.1.4 Household (HH) source of income 33
4.1.5 Number of household (HH) members 34
4.1.6 Level of education 34
4.2 Sampling adequacy 35
4.3 Factor analysis 35
4.3.1 Digital financial services adoption 36
4.3.2 Transaction costs (TCs) 36
4.3.3 Financial inclusion (FI) 37
4.4 Relationship between variables 37
4.4.1 The relationship between digital financial services adoption and financial inclusion 39
4.4.2 The relationship between digital financial services adoption and transaction costs 39
4.4.3 The relationship between transaction costs and financial inclusion 39
4.4.4 The mediating role of transaction costs on the relationship between digital financial services adoption and financial inclusion 40
4.4.4.1 Tests of statistical assumptions 40
4.4.4.2 Regression analysis 41
4.4.4.3 The mediation test 42
CHAPTER FIVE 44
DISCUSSION OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS 44
5.0 Introduction 44
5.1 Discussion of findings 44
5.1.1 The relationship between digital financial services adoption and financial inclusion 44
5.1.2 The relationship between digital financial services adoption and transaction costs 45
5.1.3 The relationship between transaction costs (TCs) and financial inclusion (FI) 45
5.1.4 The mediating role of transaction costs (TCs) on the relationship between digital financial services (DFSs) adoption and financial inclusion (FI) 46
5.2 Conclusion 46
5.3 Recommendations 48
5.3.1 Financial service providers 48
5.3.2 Government and policymakers 48
5.3.3 Researchers 49
5.4 Areas for further research 49
REFERENCES 50
APPENDICES 57

LIST OF TABLES

Table 1: Table showing households and population distribution for Masaka District.....24

Table 2: Table showing the definition of scales 25

Table 3: Table showing measurement of variables. 26

Table 4: Table showing validity test.....27

Table 5: Table showing Reliability test.....28

Table 6: Table showing Response rate.....31

Table 7: Table showing gender of respondents 32

Table 8: Table showing the age of respondents.....32

Table 9: Table showing household (HH) income.....33

Table 10: Table showing household (HH) source of Income 33

Table 11: Table showing number of household members 34

Table 12: Table showing level of education 34

Table 13: Table showing sampling adequacy tests using KMO and Bartlett's Test.....35

Table 14: Correlations between digital financial services adoption, transaction costs, and financial inclusion.....38

Table 15. Table showing correlation, tolerance value (TV), and the variance inflation factor (VIF) 41

Table 16: Table showing multiple regression analysis 41

Table 17: Table showing the mediation effect of transaction costs on the relationship between digital financial services and financial inclusion.....42

LIST OF FIGURES

Figure 1. 1: Conceptual framework showing the relationship between digital financial services adoption, transaction costs, and financial inclusion 4

Figure 4.1: Mediation model 43

LIST OF APPENDICES

Appendix 1: Questionnaire

Appendix 2: Krejcie & Morgan's Table for determining sample size for a given population

Appendix 3: Table showing Factor Analysis for Digital Financial Services Adoption

Appendix 4: Table showing Factor Analysis for Transaction costs

Appendix 5: Table showing Factor Analysis for Financial Inclusion

Appendix 6. Scatter plot showing Regression Residual against regression standardized predicted value.

Appendix 7. Normal P-P plot of Regression standardized Residual graph

Appendix 8: Results of Barron and Kenny (1986) test for mediation

Appendix 9: Letter of introduction

LIST OF ACRONYMS

ADB	African development bank
AFI	Alliance for Financial Inclusion
AT	Agency theory
ATM	Automated teller machines
BI	Behavioral intention
BOU	Bank of Uganda
CFI	Center for financial inclusion
DFSs	Digital financial service
EE	Effort expectancy
EIB	European Investment Bank
FC	Facilitating conditions
Fintech	Financial technology
FI	Financial Inclusion
FSDU	Financial Sector deepening Uganda
HH	Household
ICT	Information and communications technology
LICs	Lower-income countries
MFIs	Microfinance institutions
MM	Mobile money
MNO	Mobile Network Operators
NFIS	National Financial Inclusion Strategy
PE	Performance expectancy
SI	Social influence
TCs	Transaction costs
UTAUT	Unified Theory of Acceptance and Usage of Technology

ABSTRACT

The purpose of the study was to establish the effect of digital financial Services (DFSs) adoption and transaction costs (TCs) on financial inclusion (FI) of households (HHs) in Masaka District; therefore, establishing the extent to which DFSs adoption and TCs predict FI. This study was initiated because financial inclusion and DFSs adoption particularly mobile money adoption continue to be low despite initiatives by the government such as the launch of the national financial inclusion strategy and improvements in infrastructure to increase financial inclusion. The subject scope of the study focused on mobile money adoption and therefore generalizations were made as regards digital financial services adoption as an area of study.

A cross-sectional research design was adopted for the study. Using a simple random sampling approach, a sample of 384 respondents was obtained from households in Masaka District. The research instrument was a self-administered questionnaire seeking responses on Digital financial services adoption, transaction costs, and financial inclusion. 365 filled questionnaires were returned giving a response rate of 95%.

The findings indicate that; DFSs adoption had a positive relationship with FI; DFSs adoption had a positive relationship with TCs; while TCs had a positive relationship with FI. TCs were found to partially mediate the relationship between DFSs adoption and FI as evidenced by the decrease in predictive power from 0.723 to 0.514.

In light of the findings, various recommendations were put across on how financial service providers, governments, policymakers, and future researchers can benefit from the results of the study. The development of new products and services aimed at improving DFSs attributes, emphasis on TC (charges) reduction and service substitution to low-cost alternative products, emphasis on enhancing quality, removal of regulatory barriers that hinder the usage of the internet and mobile phones, and improvement in financial service processes. It is recommended that future researchers conduct detailed studies on theories of FI.

The study data was collected in November and December 2020, a period immediately following the lockdown imposed to control the spread of the COVID-19 pandemics. Due to the restrictions in movement and the advice by health experts to avoid handling cash, there was increased usage of digital financial services, especially mobile money. This implies that the responses could have been affected by the restrictions and the outcome could have been different in normal situations.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Recent developments in financial services specifically digital financial services (DFSs) such as mobile money (MM), Fintech and agency banking have led to greater financial inclusion (FI) (Ouma, Odongom & Were, 2017). Financial inclusion benefits society broadly and has multiplier effects on the economy through the increased reach and effectiveness of the monetary policy (Evans, 2018). Haider (2018) defines FI as the delivery of banking services at an affordable cost to the vast section of disadvantaged and low-income groups. Pazarbasioglu et al (2020) note that DFSs have increased access to affordable financial services which is critical for poverty reduction, economic growth, and FI. Despite the strategies to increase FI, only 16% of the adult population was financially included (World Bank's eighth Uganda Economic Update, 2017). Unless, stakeholders scale up the possibilities provided by DFSs and conduct assessments on substantial value addition at affordable TCs, the journey to FI will continue to be unwarranted (Sebudde, Goffe, Daka & Safavian, 2017).

Strategies to grow FI in Africa have focused on fast-tracking the diffusion of DFSs (Evans, 2018). A DFSs is a financial service delivered through mobile phones, personal computers, the internet, or cards linked to a reliable digital payment system (Demirguc-Kunt et al, 2017b; Evans, 2018). In Uganda strategies to increase FI include the launch of the national FI strategy (NFIS) 2017-2022; and the amendment of the Financial Institutions Act of 2016 (Odele, Okao & Ndiwalana, 2017). Consequently, FI has gradually increased from 28 percent in 2009 to 58 percent in 2018 (Financial Sector Deepening Uganda (FSDU), 2018a). Additionally, MM usage increased from 21% in 2011 to 43% in 2017 (Financial Inclusion Insight, 2018). Furthermore, Ugandan households (HHs) with at least one registered MM user increased from 21% in 2012 to 39.9% in 2018 (Weiser, Bruhn, Kinzinger, Ruckteschler & Hertman, 2019).

DFSs are more convenient and affordable than traditional banking services, reach a wider range of the populations (Yan & Yiping, 2016), and can contain the barriers to FI manifesting in transaction costs (TCs) (Dupas and Jonathan, 2013). TCs are the cost of carrying out a transaction through an exchange on the open market (Natamba, Mangeni, Nakabuye, Akankunda & Agasha, 2013). However, Suri and Jack (2016) show that TCs remains a

significant barrier to uptake and use of formal financial services. Busharizi (2019) observes that Uganda has seen a drop in MM transactions because costs such as taxes on withdrawal and service fees/charges are high.

Therefore, to theoretically explain DFSs adoption and the intention to use behavior of users and potential users of DFSs, the unified theory of acceptance and usage of technology (UTAUT) was used (Venkatesh et.al, 2003). Additionally, TCE was adopted for TCs since the theory was used in information technology (IT) and TCs related studies (Vasiliauskiene, 2011; Hossain, 2019). Furthermore, the systems theory of FI (STFI) was adopted since the national financial inclusion strategy; 2017 – 2022 is hinged on providing benefits (Bank of Uganda (BOU), 2017).

This study, therefore, sought to examine DFSs adoption, TCs, and FI. The study was carried out in Masaka District since it ranked first in terms of the lowest account ownership (9%) despite high median monthly income and high ownership of MM support infrastructure (82.2% mobile phones ownership).

1.2 Statement of the Problem

Uganda launched its National FI Strategy 2017-2022 in 2017. The objective of the strategy spearheaded by the Bank of Uganda is to ensure that all Ugandans have access to and use a broad range of quality and affordable financial services to ensure their financial security. The aims are to gradually increase; formal savings from 25% to 50%, adults with emergency savings from 41% to 60%, and mobile financial services from 31% to 60%. Additionally, Uganda has made significant developments in the necessary infrastructure for DFSs deployments such as the expansion of mobile network coverage and the national ICT backbone (The Collaboration on International ICT Policy for East and Southern Africa (CIPESA), 2018).

Despite the initiatives, formal FI only increased by 6% from 52% (8.7 million) in 2013 to 58% (10.8 million) adults in 2018 mostly resulting from low mobile money adoption as evidenced by 56% of adults who used MM services in 2018 (FSDU, 2018). Moreover, by December 2019, 44% of the registered MM users reduced the volume and value of their transactions. Additionally, 47% stopped using MM completely sighting extreme TCs that left them with only 98% of the money upon withdrawals (FSDU, 2018). This study, therefore, examined the effect of DFSs adoption and TCs on FI in Masaka District.

1.3 Purpose of the Study

The purpose of the study is to establish the effect of Digital Financial Services (DFSs) adoption and transaction costs (TCs) on financial inclusion (FI) of households (HHs) in Masaka District.

1.4 Objectives of the study

i. To examine the relationship between digital financial services adoption and financial inclusion.
ii. To establish the relationship between digital financial service adoption and transaction costs.
iii. To determine the relationship between transaction costs and financial inclusion.
iv. To examine the mediating role of transaction costs on the relationship between digital financial services adoption and financial inclusion.

1.5 Research Questions

i. What is the relationship between digital financial service adoption and financial inclusion?
ii. Is there a relationship between digital financial service adoption and transaction costs?
iii. What is the relationship between transaction costs and financial inclusion?
iv. What is the effect of transaction costs on the relationship between digital financial services adoption and financial inclusion?

1.6 Scope of the Study

1.6.1 Subject Scope

The study focused on the relationship between DFSs adoption and FI with specific reference to DFSs currently adopted in Uganda specifically MM services.

1.6.2 Geographical Scope

The study was carried out in selected HHs in Masaka District which lies in Central region II as per Uganda Bureaus of statistics categorization, a region with low account ownership of 9%. Masaka District was chosen because it has the 4th highest country-wide median monthly income of UGX. 186,000 and ownership of mobile phones of 82.2% which makes Masaka District unique and suitable for the study (FSDU, 2018; National Population & Housing Census 2014).

1.6.3 Time Scope

The study focused on the period from 2018 to 2019. This reference period helped in establishing the effect of TCs on the relationship between DFSs adoption and FI because it was in this period that low MM adoption and reduced volume and value of MM transactions were exhibited.

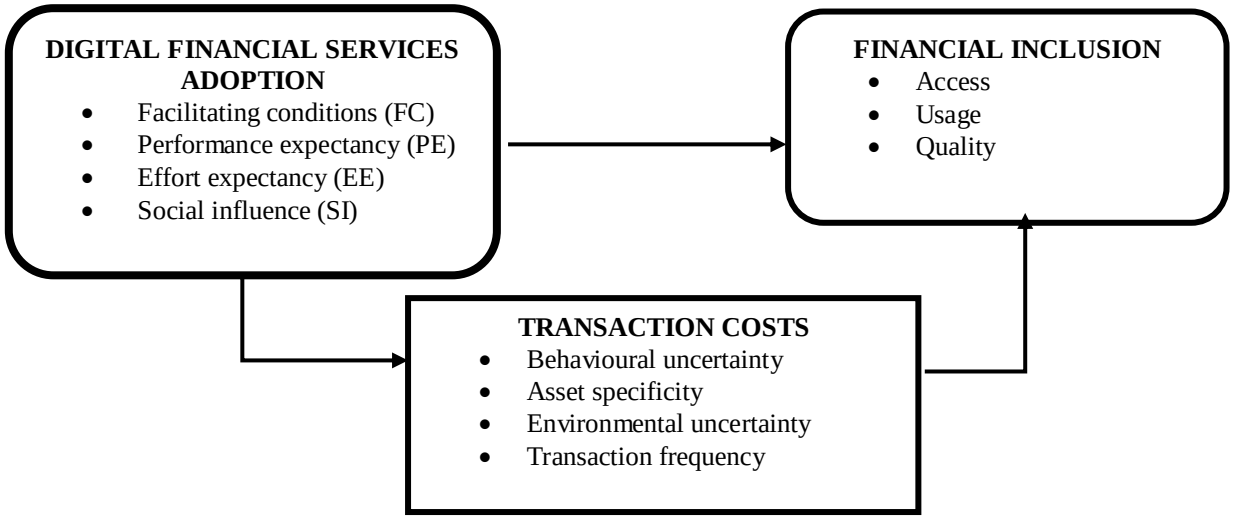
1.7 Significance of the Study

i. The study will provide policymakers with insights into the effects of Digital financial services (DFSs) and transactions cost (TCs) on the achievement of the financial inclusion agenda thereby enabling the enactment of appropriate policies and regulations to grow financial inclusion.

ii. Financial service providers will be able to use the results of this study to design, develop or improve digital products that are convenient, affordable and appeal to both consumers in urban and rural areas.

iii. The study will contribute to the existing academic literature on FI by articulating the relationship between DFSs and FI, and the mediating role of TCs on the relationship between DFSs and FI. Additionally, the study introduces the theoretical aspects of FI through the utilization of the systems theory of FI which has not been observed or elaborate in the previous academic literature on FI.

1.8 Conceptual Framework



Source: The conceptual framework was adapted and modified for the study from; Pflügler, Wiesche & Krcmar (2016); Demirguc-Kunt & Klapper (2013); AFI (2013); Bongomin, Munene, Ntayi & Malinga (2018); Sarfaraz & Alzubi (2017) and Venkatesh et.al (2003).

Figure 1. 1: Conceptual framework showing the relationship between digital financial services adoption, transaction costs, and financial inclusion

1.9 Explanation of the conceptual framework

The conceptual framework shows the relationship between financial inclusion with measures of access, usage, and quality as the dependent variable and digital financial services adoption indicated by facilitating conditions, performance expectancy, effort expectancy, and social influence as the independent variable with transaction costs as mediating variable. It is anticipated that there is a relationship between digital financial services adoption and financial inclusion and that this relationship can be mediated by transaction costs.

In addition, the framework illustrates that there is a relationship between digital financial services adoption and transaction costs. Furthermore, it is predicted that there is a relationship between transaction costs and financial inclusion.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The literature review explains the structure and contents of previous research studies on digital financial services adoption, transaction costs, and financial inclusion. This chapter is arranged under sub-sections that include theoretical framework, literature based on digital financial services adoption, transaction costs, and financial inclusion derived from the objectives.

2.1. Theoretical Framework

The study was guided by Systems Theory of Financial inclusion (STFI) (Ozil, 2020) for financial inclusion, Unified Theory of Acceptance and Usage of Technology (UTAUT) (Venkatesh et.al, 2003) for digital financial services, and Transaction Cost Economics (TCE) for the transaction cost concept. The theories are explained below.

2.1.1 Systems Theory of Financial Inclusion (STFI)

The Government of Uganda formulated the National Financial Inclusion Strategy (NFIS) 2017-2022 which is Uganda's all-inclusive strategy for promoting FI (Bank of Uganda (BOU), 2017). According to the NFIS 2017 – 2022 (2017), the outcome of FI is to provide benefits to households, the rural population, the women, the youth, and the economy in terms of raising their incomes, and accumulation of savings to better cope with shocks thereby enhancing their welfare. Since the outcome of the strategy is hinged on providing benefits (BOU, 2017), then the system theory of financial inclusion (STFI) is the most appropriate since it focuses on who benefits and how they benefit from FI outcomes (Ozili, 2020).

According to Ozili (2020), the theory states that financial inclusion (FI) outcomes are achieved through existing sub-systems such as economic, social, or financial systems which FI relies on. The theory suggests that FI improves the workings of the sub-systems it relies on and ultimately, the existing sub-systems in a country are the beneficiaries of FI. This emanates from the fact that Countries with deeper and more developed financial systems can allocate capital and risks more efficiently and consequently enjoy higher economic growth and larger reductions in poverty and income inequality (Pazarbasioglu et al, 2020).

Ozili (2020) observes that a significant change at the full system level such as replacing the existing national FI plan does not necessarily lead to a change in the existing sub-systems. However, a significant change in one part of the system can significantly affect the expected FI outcomes (Ozili, 2020). For instance, Ozili (2020) notes that imposing regulations can lead to affordable and quality financial services by aligning the interests of economic agents and suppliers with that of the users of the financial services. Ozili (2020) further notes that changes in the financial system such as the introduction of DFSs can lead to efficient access to, usage, and quality financial services and the success of the FI agenda.

2.1.2 The Unified Theory of Acceptance and Usage of Technology (UTAUT)

According to Mugambe (2017), explaining the suitability and use of technology has been a subject of discussion among researchers with different models advanced. One of such models is the Unified Theory of Acceptance and Use of Technology (UTAUT) according to Venkatesh et al. (2003). Malinga, Maiga, Jehopio & Kareyo (2017) postulate that UTAUT theory explains user intentions to use Information technology (IT) and subsequent usage behavior, and since DFSs are IT services, UTAUT can be applied to the study of DFSs adoption. Additionally, since the use of m-payment and MM services adoption constitutes DFSs adoption, and UTAUT was used in the study of M-payment and MM services adoption, it can be applied to DFSs adoption study as well (Abrahãoa, Moriguchib, & Andrade, 2016; Malinga, Maiga, Jehopio, & Kareyo, 2017; Bhatiasevi, 2016; and Mugambe, 2017).

The UTAUT which was postulated in 2003 by Venkatesh et.al through a systematic review and consolidation of the constructs of earlier eight models is preferred for explaining the adoption of technology. The eight theories and models include; Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), Motivation Model (MM). The other theories include; the Theory of Planned Behavior (TPB), Extended Technical Adoption Model (TAM2), Diffusion of innovation theory (DOI), SCT, and model of personal computer use (Venkatesh et.al, 2003).

The UTAUT model is based on four important constructs of performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) being the direct determinant of the behavioral intention of the eventual technology user. Apart from the four constructs, the relationship is moderated by individual differences in terms of gender, age, experience, and voluntariness in Venkatesh et al. (2003). Upon review of UTAUT, Venkatesh et al. (2003) dropped voluntariness as one of the moderating variables leaving only three constructs but also introduced three additional direct constructs as hedonic motivation, price

value, and habit in what was called UTAUT2. The theoretical backbone of this study is the first UTAUT model as proposed in Venkatesh et al. (2003), focusing on the four important constructs of PE, EE, SI, and FC. The theory proposes that behavioral intention (BI) to use technology is influenced by PE, EE, and SI, while BI and FC determine technology use (Venkatesh et al, 2003).

However, Dwivedi et al (2017) demonstrate that the moderators specified in the original UTAUT model may not be applicable in all contexts and propose that individual characteristics such as attitude be introduced. Dwivedi et al (2017) further demonstrate that attitude partially mediates the effects of PE, EE, FC, and SI on BI, and also directly affects user behavior. In conclusion, on one hand, Venkatesh et.al (2003) postulate that BI to use technology is influenced by PE, EE, and SI, while BI and FC determine technology use. On the other hand, Dwivedi et al (2017) introduce individual characteristics such as attitude which they argue partially mediates the effects of PE, EE, FC, and SI on BI, and also directly affect technology use.

2.1.3 Transaction Cost Economics (TCE)

TCE was adopted for the study since it had been used in IT-related studies and since DFSs are IT-related, the theories can be applied to the study (Vasiliauskiene, 2011; Hossain, 2019). The TCE, developed by Williamson (1979), recognizes the critical dimensions through which transactions vary (Hossain, 2019). Hossain (2019) defined a transaction as an exchange between a customer and a provider where the two parties each obtain something from the other at a cost to each other. TCE suggests that customers choose a provider with which the TCs i.e. the set of costs - direct (like charges and taxes) and indirect costs (like travel costs and opportunity costs) incurred by the customer in each transaction are minimum. According to Vasiliauskiene (2011), the use of technology can decrease TCs as a result of reduced direct and indirect costs. Hossain (2019) postulates that when other factors remain the same and TCs are negligible, customers select a provider purely based on the price of the product and this notion applies to IT environments including DFSs.

TCE identifies uncertainty, frequency of exchange/transaction, and asset specificity as the principal dimensions describing transactions (Hossain, 2019). Yousuf (2017) observes that two main factors lead to high TCs namely; human factors which include; opportunism and bounded rationality; and environmental factors which include; transaction-specific assets, uncertainty, and frequency. Pflügler, Wiesche & Krcmar (2016) postulate that the three central constructs of TCE are uncertainty, transaction frequency, and asset specificity.

Pflügler et al (2016) observe that uncertainty can further be divided into environmental and behavioral uncertainty while asset specificity can be divided into site-specificity, physical asset specificity, and human asset specificity. Pflügler et al (2016) further observe that only environmental uncertainty and transaction frequency have a high descriptive influence on transaction costs while behavioral uncertainty and asset specificity are only of minor significance. On the other hand, Hossain (2019) concludes that for IT services, uncertainty, and asset specificity affect customer behavior.

In summary, Ozili (2020) through the STFI speculates that FI outcomes are achieved through the existing subsystems (economic, social or financial) in a country and ultimately, greater FI will have benefits for the system it relies on. The benefits include increased access to finance and reduced cost of financial intermediation for banks and Fintech providers (Ozili, 2018). Ozili (2020) further argues that the benefits and the success of a FI agenda are achieved through the efficiency and effectiveness of the sub-systems. On the other hand, Venkatesh et al (2003) and Hossain (2019) contend that other fundamental factors determine FI outcome. These factors include; the four UTAUT predictors of users' behavioral intentions and behavior of use (Venkatesh et al., 2003), and the three principal dimensions of TCE (Hossain, 2019).

Ozili (2020) contends that significant changes to improve the efficiency and effectiveness of a sub-system such as the DFSs should be made at the subsystem level to significantly affect the FI outcomes. Ozili (2018) acknowledges that DFSs can improve access to financial services and profitability to banks due to cost-efficiency and lead to greater FI. Similarly, the Transaction Cost Economics (TCE) theory suggests that the use of technology decreases TCs by lowering costs of information search, coordination, and processing payment (Hossain, 2019; Vasiliauskiene, 2011). In conclusion, the arguments by Venkatesh et al (2003) and Hossain (2019) elaborate one of the fundamental flaws of the STFI which focuses on the effect of the system and its sub-systems on FI outcomes and assumes a lack of influence of factors outside the system on FI outcomes (Ozili, 2020). Therefore Venkatesh et al (2003) and Hossain (2019) indicate that there is a relationship between DFSs, TCs, and FI, which contradicts the STFI that concentrates on the relationship between the system and its sub-systems' and FI outcomes thereby ignoring the effect of external factors such as DFSs and TCs.

2.2 Financial Inclusion (FI)

2.2.1 The concept of financial inclusion

The FI concept has attracted varied definitions (Ulwodi & Muriu, 2017). On one hand, some authors use both the financial access and usage strands/lenses to define FI (BOU, 2014). For instance, according to Alliance for Financial Inclusion (AFI) (2013), FI is a multi-dimensional concept that goes beyond access to encompass usage and quality of formal financial services. Relatedly, Demirguc-Kunt et al (2017a) define FI as the access and effective use of various financial services which starts with the ownership of a deposit or transaction account at a formal financial institution or a MM service provider and can be used to make and receive payments, save, access credit and use formal insurance products. Similarly, FSDU (2018b) defines FI as the access or use of financial services provided by financial service providers who are regulated or supervised.

On the other hand, some authors such as FinScope Uganda use either the usage or access strand and define FI as the usage of either BOU regulated or other formal or informal financial institutions. Similarly, the Center for financial inclusion (CFI) at Accion (2019), defines FI as the concept which encompasses access to a full suite of quality financial services for customers who possess financial capabilities, provided via a diverse and competitive marketplace.

Other authors such as Evans (2018) and Ozili (2018) focus on financial services, products, beneficiaries, and FI outcomes and define FI as the provision of suitable formal affordable financial products and services to the large segment of the vulnerable and low-income groups and bringing them into the formal economy by increasing the number of individuals that have access to formal financial services mainly through having formal bank accounts.

In conclusion, while Ulwodi and Muriu (2017) postulate that FI has attracted varied definitions, most of the definitions have some consensus that FI entails access and usage of quality or suitable financial services provided by supervised or regulated providers to beneficiaries such as vulnerable and low-income groups and the intended outcome such as increasing the number of individuals that have access to formal financial services (AFI, 2013; Demirguc-Kunt et al, 2017a; FSDU, 2018b; Evans, 2018; and Ozili, 2018). However, the definition by CFI at Accion (2019) provides a more elaborate definition as it captures access and quality financial services but also includes the fact that customers should possess financial capabilities.

2.2.2 Measures of financial inclusion (FI)

FI is measured using three dimensions namely; access, usage, and quality (Alliance for Financial Inclusion (AFI), 2013; Evans, 2018; Ozili, 2018; Demirguc-Kunt et al, 2017a and FSDU, 2018b). The AFI (2013); Mindra & Moya (2017) assert that access measures the physical and range of financial services, and individuals' ability to use the available financial products and services at a service point; while usage measures the ability to derive permanent purpose and value from a particular financial product or service.

The quality dimension measures the relevance of the financial products or services in the day-to-day needs of the financial consumer (AFI, 2013; Mindra & Moya, 2017). On one hand, Al-Aali, Khurshid, Nasir, Al-Aali (2011) exert that quality is measured using the service quality model. On the other hand, AFI (2016) proposes that quality indicators are divided into eight categories: affordability, transparency, convenience, fair treatment, consumer protection, financial education, indebtedness, and choice. AFI (2016) further proposes that the indicators cover aspects that are required for one to enjoy quality financial services.

Since the services quality model was used in related studies on MM transactions, which is a DFS (Al-Aali et al., 2011), this study will adopt the service quality to measure quality. The service quality model originally had 5 dimensions namely: tangibility, reliability, responsiveness, assurance, empathy while the other two factors namely; network quality; and competitive advantage were added to accommodate the mobile sector-specific requirements (Al-Aali et al., 2011).

Al-Aali et al (2011) define tangibility as physical facilities, equipment, employees' dress, and communication material while reliability refers to the ability to perform promised services accurately and honestly. They define responsiveness as the willingness to help customers and to provide prompt services, while assurance was defined as the knowledge and courtesy of the employee and their ability to inspire trust and confidence (Al-Aali et al., 2011). In addition, empathy covers individualized attention of the firm to its customers, network quality refers to the strength of the network and call quality while competitive advantage refers to the provision of a better price, services, and promotions than its competitors (Al-Aali et al., 2011).

2.3 The concept of Digital Financial Services (DFSs)

Historically technology has been introduced in banking; the earliest was the automation of bank statements in 1916s; introduction of ATMs between the 1960s to early 1980s; adoption

and diffusion of technology, such as digital finance, mobile banking, mobile payments, and FI in the period of 1983 -2015; and the latest being Fintech (Kalenzi & Kwon, 2018).

2.3.1 Defining Digital Financial Services (DFSs)

According to Ozili (2018), there is no standard definition of DFSs. Ozili (2018) postulates that DFSs encompasses all products, services, technology, and/or infrastructure that enable individuals and companies to have access to payments, savings, and credit facilities via the internet (online) without the need to visit a bank branch or without dealing directly with the financial service provider. On the other hand, Gomber, Koch & Siering (2017) suggest that DFSs encompass a magnitude of new financial products, financial businesses, finance-related software, and novel forms of customer communication and interaction delivered by FinTech companies and innovative financial service providers.

In conclusion, Ozili (2018) argues that there is no standard definition of DFSs. However, there is some consensus that DFSs encompass financial products or services, technology, or infrastructure as a delivery mechanism (Ozili, 2018; Gomber et al., 2017). This study, therefore, adopts the definition by (Pazarbasioglu et al, 2020) who define digital financial services as financial services i.e., transactions, payments, savings, credit, and insurance which rely on digital technologies such as fintech, automated teller machines (ATMs), mobile money, agency banking and internet banking for their delivery and use by consumers.

2.3.2 Composition of Digital Financial Services (DFSs)

The study by CGAP (2015) indicates that there are ideally three key components of any DFSs: a digital transactional platform, retail agents, and the use by customers and agents of a device such as a mobile phone to transact via the digital platform. On the other hand, Bachas et al (2018); Kalenzi and Kwon (2018); Gomber et al (2017) speculate that the composition of DFSs includes automated teller machines (ATMs), debit cards, mobile money, agency banking, internet banking, and Fintech. The definition by Bachas et al (2018); Kalenzi and Kwon (2018); Gomber et al (2017) focus on the infrastructure used to deliver the financial services. CGAP (2015), on the other hand, offers a more detailed composition of DFSs to include the platform, the providers, and the infrastructure such as the device used to access financial services. The composition of DFSs include;

2.3.2.1 ATMs and Debit cards

Harihareswara, Kwebiiha, Ogba, Duijnhouwer, & Favrichon (2017) define an ATM as an electronic telecommunications device that enables the clients of a financial institution to

perform financial transactions without the need for a cashier, human clerk, or bank teller and may be operated either offline or online with real-time access to an authorization database. Harihareswara et al., (2017) further define a debit card as an electronic card issued by a bank that provides the bank client with access to his/her account to withdraw or deposit cash and/ or pay for goods and services.

2.3.2.2 Mobile Money (MM)

Munyegera and Matsumoto (2015) define MM as a financial innovation that allows deposit, exchange, and withdrawal of money which is limited to services that can be used without a formal account. However, recent developments have led to a broader range of services which include the integrated access to formal bank services through partnerships between Mobile Network Operators (MNOs), registered commercial banks, and deposit-taking microfinance institutions (MFIs) (Munyegera & Matsumoto, 2015). This has led to new services like micro-savings and credit such as M-Shwari in Kenya and Mokash in Uganda that use behavioral algorithms to determine credit worthiness, credibility, and loan limit (Baike, 2018).

2.3.2.3 Internet Banking

Alkailani (2016) defines Internet Banking as the delivery of banking services through the open-access computer network (the internet) directly to customers' homes on the private address. It is a new distribution channel for the delivery of banking services (Alkailani, 2016).

2.3.2.4 Agency Banking

According to Aduda, Kiragu, & Ndwiga (2013), agency banking refers to bank partnerships with non-banks, typically retail commercial outlets such as lottery kiosks, pharmacies, post offices, construction goods stores, and so forth, to provide distribution outlets for financial services. Aduda, Kiragu, & Ndwiga (2013) further define an agency bank as an organization that acts in some capacity on behalf of another bank, offers normal banking services through shared infrastructures, and allows banks to reach new customers.

2.3.2.5 Fintech

Kalenzi and Kwon (2018) postulate that Fintech which is a short term for financial technology generally refers to software and other technologies used to facilitate banking and financial services. Kalenzi and Kwon (2018) further state that Fintech is internet-based

innovation that relies on advanced communication tools and information processing to facilitate financial transactions.

2.3.3 Categories of digital financial services (DFSs)

Evans (2018) postulates that there are three broad categories of technology-based financial services models in Africa namely; bank-focused models, bank-led models, and non-bank-led models. Evans (2018) further postulates that the bank-focused models use non-traditional low-cost delivery channels which include ATMs, internet banking, and mobile money to connect to the customers for increased financial inclusion. In addition, Evans (2018) describes the bank-led model as a model that gives the customers a whole range of financial transactions using retail agents or mobile phones. In the non-bank-led models, the bank's role is the safe-keeping of funds while the account management function is carried out by a telecom operator (Evans, 2018).

2.3.4 Measures of digital financial services adoption

Adoption refers to the stage in which technology is selected for use by an individual or an organization (Sharma & Mishra, 2014). Sharma and Mishra (2014) further note that technology adoption is not restricted to aspects of technology but involves dimensions of user attitude and personality, social influence, trust, and facilitating conditions. As such, four constructs that may be used in explaining the adoption of emerging technologies include; performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (Venkatesh et.al, 2003).

According to Venkatesh et al (2003), PE is defined as the extent to which using technology provides benefits to the users. On the other hand**,** Abrahãoa, Moriguchib, & Andradeb (2016) define PE as the measure of how much people realize that a system such as the Internet or mobile technology is useful in carrying out their tasks in day-to-day work.

Venkatesh et al (2003) define EE as the degree of ease associated with the use of technology to the user (Venkatesh et al, 2003), while Abrahãoa et al (2016) define it as the degree of ease associated with the use of the system and originates from three constructs of existing models: perceived ease-of-use, complexity, and ease of use. Regarding SI, Venkatesh et al., (2003) define it as the extent to which the users perceive those who are important to them believe they should use the technology. On the other hand, Abrahãoa et al (2016) define SI as the degree of influence that opinions of others can have on the adoption of a given system.

Finally, FC refers to the user's perception of the resources and support systems available to use the technology (Venkatesh et al, 2003).

On one hand, Abrahãoa et al (2016) found that PE, EE, and SI had a positive relationship with the intention of adoption of mobile payment while EE was singled out as one of the greatest determinants of intention to adopt the technology. On the other hand, Mugambe (2017) found that PE, EE, and SI had a relatively strong relationship with behavioral intentions while behavioral intention with FC had a strong relationship with behavioral use. Mugambe (2017) further found that individually SI had the most significant effect on mobile money usage followed by FC. Bhatiasevi (2016) supports the findings of Abrahãoa et al (2016) and Mugambe (2017) by observing that PE, EE, and SI each have a direct effect on behavioral intention, while FC and behavioral intention have a direct effect on user behavior.

In conclusion, therefore, while Abrahãoa et al (2016) singled out EE as one of the greatest determinants of intention to adopt the technology. On the contrary, Mugambe (2017) found that individually SI had the most significant effect on the MM usage followed by FC.

2.3.5 Factors affecting digital financial services adoption

GSMA (2014) contends that the prospect of reaching billions of new customers has led to the offering of innovative DFSs by banks and nonbanks. For example, according to the European Investment Bank (EIB) (2014), Kenya is known globally as the DFSs success story, where a single mobile network operator (MNO), Safaricom, launched a DFSs called M-PESA in 2007. The EIB (2014) further states that few technologies have seen the viral and impressive uptake as that of M-PESA's DFSs in Kenya, and there is a multitude of unique un-replicable factors that led to that success.

The EIB (2014) suggests that policy and regulations, the existence of customers, high volumes, providers, delivery infrastructure among others were responsible for the success and adoption of DFSs in Kenya. However, Evans (2018) argues that some factors are not unique to Kenya alone and have been replicated in other African countries such as the increased adoption of internet-enabled phones that has brought internet access to many across the African region. The World Bank (2016) supports the argument by Evans (2018) and acknowledges that a large amount of the excluded population has a mobile phone and affordable internet connectivity which can help fuel the adoption of digital finance and increase the provision of financial services via mobile phones and related devices to the excluded population.

However, the African development bank (ADB) (2016) argues that there are negative factors such as the low level of financial literacy and low awareness of digital finance channels which affect the use of digital financial channels to perform basic financial services. Furthermore, Caruana (2016) speculates that increased pervasiveness and scale of cyber-attacks are a significant threat to the security and privacy of customers' data and a barrier to DFSs adoption.

In conclusion, the EIB (2018)'s argument that the multitude of factors that led to the viral and impressive uptake of M-PESA's DFSs in Kenya are unique and un-replicable contradicts Evans (2018) and the World Bank (2016)'s argument that some of the factors such as the existence of support infrastructure are not unique and are replicable in other African countries. Therefore, Evans (2018) and the World Bank (2016)'s argument support the conclusion that there are replicable factors from the Kenya case that have been adopted by other countries hence increased adoption of DFSs and increased usage of financial services hence increase in FI, which indicates a positive relationship between DFSs and FI. Additionally, the African development bank (ADB) (2016) argument points at an increase in uncertainty that affects the adoption DFSs, hence pointing at a positive relationship between DFS adoption and TCs.

2.4 Transaction Costs (TCs)

Zhengchao, Qin & Pan (2012) define transactions as activities of buying or selling objects or interests among people and occur when a good or service is transferred across a technologically separable interface where one stage of activity terminates and another begins by the medium of currency. Vasiliauskiene (2011) on one hand, defines transaction costs as the costs which are incurred when goods or services are exchanged. On the other hand, Natamba et al., (2013) define transaction costs as the cost of carrying out a transaction through an exchange on the open market and involves the economic costs that organizations incur both outside the firm and inside the firm. Other authors such as Agyekum, Locke & Hewa-Wellalage (2017) suggest that TCs include information gathering, time and distance costs of accessing formal banking services.

The strength of the definition by Natamba et al (2013) lies in the fact that it acknowledges that costs occur both outside and inside the firm in addition to recognizing that TCs arise from an exchange transaction as stipulated by both Vasiliauskiene (2011) and Natamba et al (2013). The definition by Agyekum et al (2017) is limited as it only provides examples of

TCs therefore it is useful only to the extent that it is used alongside the definitions by Vasiliauskiene (2011) and Natamba et al (2013) as examples of TCs.

In this study, therefore, TCs will be defined as the costs which are incurred when goods or services are transferred through an exchange on the open market across a technologically separable interface where one stage of activity terminates and another begins by the medium of currency and involves the economic costs that organizations incur outside and within the firm (Zhengchao et al., (2012); Vasiliauskiene (2011); Natamba et al., (2013); Agyekum et al, 2017).

2.4.1 Components of transaction costs

Bachas et al (2018) separate TCs into indirect and direct costs and define indirect costs using its compositions which include travel time and the distance to the nearest bank. Direct costs are defined as costs such as opening fees and minimum deposits. On the other hand, Karlan, Ratan & Zinman (2013) divide TCs into pecuniary (monetary) and non-pecuniary (non-monetary) costs. Karlan et al., (2013) define non-pecuniary costs as costs associated with travel costs, opportunity costs concerning time and foregone wages, and administrative hassle or information gathering costs. While, pecuniary costs are defined as costs associated with a specific bank account such as minimum deposit requirements, withdrawal fees, opening fees, administrative requirements (Karlan et al, 2013).

In the definition by Karlan et al (2013) costs are separated into monetary and non-monetary costs, however, eventually, even the non-pecuniary (non-monetary) costs become monetary as they may directly require funds (money) or lead to the loss of funds (money). This, therefore, makes the definition by Bachas et al (2018) more appropriate since there is no contradiction when costs are separated into indirect and direct costs other than into pecuniary (monetary) and non-pecuniary (non-monetary) costs.

2.4.2 Dimensions of transaction costs

According to Pflügler, Wiesche, and Krcmar (2016), the three central constructs of TCE are uncertainty, transaction frequency, and asset specificity. Pflügler et al (2016) observe that Uncertainty can further be divided into environmental and behavioral uncertainty. Pflügler et al (2016) further observe that asset specificity can be divided into site-specificity, physical asset specificity, and human asset specificity.

Environmental uncertainty is uncertainty that stems from the lack of knowledge about the future state regarding the environment of the transaction (Pflügler et al, 2016). Pflügler et al (2016) define Behavioral uncertainty as uncertainty that originates from the lack of knowledge regarding the actions of the parties involved in the transaction.

On the other hand, asset specificity is defined as the degree to which the assets used to conduct an activity can be redeployed to alternative uses and by alternative users without the sacrifice of productive value (Pflügler et al, 2016). Pflügler et al (2016) note that asset specificity can be divided into site-specificity (geographical site of investment), physical asset specificity (Equipment and tools), and human asset specificity (knowledge and learning).

Regarding transaction frequency, Pflügler et al (2016) observe that transaction frequency focuses on the recurrence of activities that are needed for the transaction.

2.5 The relationship between digital financial services (DFSs) adoption and financial inclusion (FI)

Most studies on DFSs adoption and FI have focused on the bank-focused models (Evans, 2018). On one hand, Evan (2018) demonstrates that strategies to grow financial inclusion in Africa must focus on the acceleration of the diffusion of the internet and mobile devices (i.e., Bank-focused models). Similarly, Agyekum et al., (2017) find that the strength of mobile-based DFSs is greater in deepening financial inclusion compared to the bank-based (debit/credit cards usage). Ozili (2018) supports the finding and argues that the provision of financial services via mobile phones and related devices contributes to FI. On the other hand, Schaner (2013) argues that providing bank-based (ATM cards) has a significant impact on account use and increased saving.

In conclusion, Evan (2018); Agyekum et al (2017); and Ozili (2018) argue that bank-led mobile-based DFSs contributes to greater FI compared to the bank-based (debit/credit cards) which contradicts the argument by Schaner (2013) who suggests that use of the bank-based focused model device – ATMs increase account use and savings hence increase in FI.

2.6 The relationship between transaction costs and financial Inclusion

Demirguc-Kunt and Klapper (2013), Munyegera and Matsumoto (2015), and FSDU (2018b) posit that the main reasons for the failure to adopt formal financial services are the high cost of operating a bank account, proximity to services that push up travel costs, inability to

maintain the minimum balance and the perceived high cost of banking services. This is supported by Dupas and Robinson (2013) who suggest that eliminating opening fees and minimum deposit requirements leads to high uptake and use of the accounts. Evans (2018) also reaches a similar conclusion when he speculates that opening a bank account is hard and not available for a large number of people in rural areas largely due to document requirements by the bank and the high costs of account maintenance.

From the above discussion, we can deduce that high TCs reduce FI, however, AFI, Kijang, and Jalan Dato' Onn (2021) stipulate that TCs could incentivize, disincentivize, or may have no effect on FI. Mawejje and Lakuma (2019) indicate that MM could reduce the traditional TCs such as the risks involved in dealing with cash, travel (to the bank), waiting times, and exposure to losses (e.g., via theft). AFI et at., (2021) shows that TCs may not necessarily impact consumer behavior or usage, such as the case of Pakistan where providers increased the price of over-the-counter (OTC) transactions to three times the pricing of wallet transactions, thereby making wallet pricing nearly free, however, the low TC on wallets in contrast to OTC had little impact on user behavior in terms of increasing wallet usage (AFI et at., 2021). This was because other factors such as market preferences, perceptions, satisfaction, and rewards provided to agents for providing good customer service during OTC transactions outweighed the reduced TCs and influenced customer behavior away from wallet usage (AFI et at., 2021). We can see from the above scenario that behavioral uncertainty led to the increase in usage of one service at the expense of another thus increasing FI.

Additionally, in terms of Environmental uncertainty, Government policies like tax policies such as taxes on MM transactions, lead consumers to view the tax as contributing to a rise in transaction costs (AFI et at., 2021). However, Lees and Akol (2021) find that taxes were unlikely to influence demand for person-to-person (P2P) transfers, as the total tax burden was small compared to other transactions costs and few alternatives. Lees and Akol (2021) also find that taxes might discourage the broad adoption of more 'advanced' uses of MM, such as merchant payments and mobile credit. Relatedly, AFI et at., (2021) show that unfavorable TCs could either disincentivize usage or compel consumers to adopt alternatives to avoid such costs, for instance, the introduction of a 0.5% tax on withdrawals has compelled users to reduce withdrawal transactions and increase the usage of other services such as payments, etc. Uncertainty in the ecological environment i.e., health also affects FI as seen in Katusiime (2021) where the COVID-19 pandemic led to increased access and usage of MM, hence, an increase in FI because of the threats posed by cash in transmitting the virus. Furthermore,

while MM services were already facilitating FI in Africa before the onset of the pandemic, policymakers put in place measures that support the widespread use of MM services as an effective tool for moving money within African countries under restrictions, particularly during the COVID-19 pandemic (Katusiime, 2021).

In terms of transaction frequency, if the transaction values are used as an indication of transaction frequency, according to the Bank of Uganda (2020), MM transaction value increased from UGX. 1,206,845,135 in 2017 to UGX. 2,840,934,220 in 2019 (135%). The 2017 to 2019 period is the period immediately before and the period in which the tax on mobile money was introduced respectively (Lees & Akol, 2021). Though the increase of 135% in transaction frequency implied an increase in TCs related to taxes, there was an increase in usage therefore an increase in FI.

In addition, according to the Uganda communication commission (UCC) (2015), stakeholders indicated that USSD service providers had issues with service quality.UCC (2015) stipulates that mobile services can be accessed through USSD MM applications through feature phones, smartphones, and IP-based communications sessions which are accessed through smartphones, therefore, to benefit from both USSD and IP-based communications sessions and increase the quality of service there is a need to upgrade from featured phones to smartphones which have cost implications (UCC, 2015). Therefore, an increase in asset specificity leads to an increase in financial services quality thus an increase in FI.

In conclusion, Demirguc-Kunt and Klapper (2013), Munyegera and Matsumoto (2015), FSDU (2018b), Dupas and Robinson (2013), and Evans (2018) indicate that there is a negative relationship between TCs and FI. However, AFI et at.,(2021) and Lees and Akol (2021) contradict this assertion by showing that that TCs could have a negative, no effect, or positive relationship with FI.

2.7 The relationship between digital financial services (DFSs) and transaction costs (TCs)

Micheni et al (2013) suggest that TCs should be lower to make the cost of mobile payment affordable and thus competitive to the poor. An article in the New Vision of Monday 13th August 2018 pg. 30 exhibits the effect of high TCs by showing that the government's introduction of the tax on mobile money transactions and high mobile money service charges led to the decrease in high-value transactions. Busharizi (2019) indicates that a similar mobile

money service in China called “WeChat pay” was booming because the charge was only 0.1% on transactions which resulted in both high and low bills being paid by phone.

Bachas et al (2018) find that debit cards lower TC by reducing the distance to access bank accounts, decreasing important forgone activities, and reduction in indirect TC which improved FI. Similarly, Evans (2018) shows that digitization of remittances helps overcome costs and physical barriers that hinder FI. In contrast, Caruana (2016) speculates that increased risks and uncertainty arising from DFSs adoption are a significant threat to customers and a barrier to adoption.

In conclusion, Evans (2018); Busharizi (2019); and Bachas et al (2018) show that mobile payments, debit cards, and mobile money help overcome costs and physical barriers that hinder FI hence indicating that there is a negative relationship between DFSs adoption and TCs. This is further supported by Micheni et al (2013) who show that though the TCs of sending money through mobile payment technology is lower than those of banks, MM costs remain a major hindrance to the adoption of MM products. However, Caruana (2016) shows that there is a positive relationship between DFSs adoption and TCs, especially uncertainty.

2.8 The mediating effect of transaction costs on the relationship between digital financial services adoption and financial inclusion

Hieltjes and Petrova (2013) posit that many low-income individuals in developing countries face significant TCs in opening a bank account or participating in the formal financial sector. On one hand, Dupas & Robinson (2013) show that TCs are a significant influence on the take-up, use of formal financial services, and the adoption of DFSs which are key to increased FI. Dupas and Robinson (2013) further show that the costs of illiteracy are significant in the rural populations of developing countries where the initial setup costs and maintenance costs of digital financial aids are considerably high which in turn reduces FI.

On the other hand, Ozili (2018) argues that DFSs such as ATMs, debit cards, mobile money, and digital credit, have the potential to reduce TCs. Agyekum et al (2017) support Ozili (2018)’s argument and conclude that ICT influences service provision through the supply of credit information which reduces information asymmetry and TCs and leads to more FI. However, the UN Capital Development Fund report (2017) shows that the lack of TCs transparency of DFSs can hinder the adoption and usage of DFSs. The latter further supports Suri and Jack (2016) who assert that TCs may limit the uptake of DFSs if customers incorrectly perceive the products as too expensive thereby hindering effective FI.

In conclusion, Hieltjes & Petrova (2013); and Dupas & Robinson (2013) show that TCs are a hindrance to FI and the adoption of DFSs. Ozili (2018) and Agyekum et al (2017) argue that DFSs possess the potential to provide affordable, convenient, and secure banking services thus decreasing TCs and increasing FI. However, Ozili (2018) contradicts the argument by further demonstrating that the availability of DFSs to the poor and low-income individuals is not convenient if it is not cheaper to access than walking into a banking hall.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presented the research methodology that was used in achieving the objectives of this study. It presents the research design, area of study, study population, sampling procedures, data collection methods and instruments, quality control methods, data management and processing, data analysis, and ethical considerations.

3.1 Research Design

The study adopted a cross-sectional design which allowed the collection of large amounts of data over a short period (Okello, 2018). Okello (2018) observes that a cross-sectional design solves the problem of recurrent mistakes in data collection instruments since data is collected at a specific point in time. Additionally, the quantitative method approach will be used to help in making statistical explanations and inferences about the key variables of the study (Mindra & Moya, 2017).

The deductive approach was adopted for the study because it allows the researcher to test a theory by creating assumptions, verifying them by collecting data, applying statistical tests, and then observing the findings (Rahi, 2017).

3.2 Population

The population is comprised of individual adults from Masaka District. The district statistics show that there are 135,061 adults (18 years and above). In addition, the district statistics indicate that there are 75,494 households which translates into approximately two adults per household. Individuals (adults) were specifically considered because the study was demand-side focused and was able to inform the study on the access, adoption, and usage behavior relating to digital financial services and financial inclusion. (National Population & Housing Census, 2014).

3.3 Sample Size

To avoid un-guided generalization, sampling was based on Amin (2005), who suggests that sampling is important in selecting elements such that the sample elements selected represent the population. A sample of 384 respondents drawn from 75,494 HHs in Masaka District and determined using the Krejcie & Morgan table of sample determination was used. This number was considered to be large enough to yield reliable data and to guard against non-response.

3.3.1 Sampling Techniques

The researcher used simple random sampling for selecting HHs during data collection. Simple random sampling was employed to give every unit of the population an equal opportunity of being selected.

3.3.2 Sampling Procedure

A three-stage sampling approach was used to arrive at a representative sample of respondents. The first stage of sampling ensured geographic representation where the sample of 384 HHs was selected using a probability proportional to size (PPS) approach ensuring representativeness from each county and the city (Okello, 2018), as shown in the table below.

Table 1: Table showing households and population distribution for Masaka District

Item	**Masaka City**	**Bukoto County East Constituency**	**Bukoto County Central Constituency**	**Masaka District (Totals)**
Households	28,493	25,665	21,336	**75,494**
Sample size	**142**	**132**	**110**	**384**

Source: National Population and Housing Census, 2014

The second stage of sampling entailed selecting the HHs at random from the city and the counties. During the third stage of sampling one adult (i.e., an individual 18 years or older) was selected at random from each of the selected HHs (Okello, 2018). The unit of analysis was HHs in Masaka District and the unit of inquiry was an individual in the HH.

3.4 Data Source

The study employed primary data sources to come up with the appropriate information on the topic under investigation. Primary data was collected through the administration of questionnaires to the respondents (people of 18 years and above). Taherdoost, (2016) describes primary data as those which are collected afresh and for the first time, and thus happen to be original. Primary data was collected through the administration of questionnaires to each household and distributed to be filled by the respondents.

3.5 Data Collection Instruments

3.5.1 Questionnaires

Primary data was collected through a self-administered closed-end questionnaire. The questionnaire contained structured questions relating to digital financial services adoption, transaction costs, and financial inclusion. The questionnaire consisted of four sections: Section A for demographics, Section B for collection of data on financial inclusion (Dependent variable), and Section C for collection of data on digital financial services adoption (Independent variable) while Section D was used for collection of data on transaction costs (mediating variable).

The researcher used a questionnaire designed on a Linkert scale with a five-response continuum of strongly agree to disagree as weighed from scale 1-5 respectively. The use of the five (5) point as opposed to seven (7) and nine (9) point Linkert scale was to reduce the level of difficulty in decision making while answering the questions in each item and impose the lowest possible response burden. The responses to the questionnaire items were analyzed using mean and standard deviation generated through the SPSS package with an appropriate scale. The Linkert scale was designed with scales of 1 - 5 for interpretation of the results as shown below in table 3:

Table 2: Table showing the definition of scales

Description	Scale	Interpretation
Strongly agree	5	Very high
Agree	4	High
Undecided	3	Average
Disagree	2	Low
Strongly disagree	1	Very low

Source: Primary data

3.6 Measurement of Variables

The variables of the study included; Digital financial services (DFSs), Transaction costs (TCs), and Financial Inclusion (FI). FI was measured using the dimensions of; Access; usage; and Quality. DFSs were measured using; Facilitating conditions (FC); Performance Expectancy (PE); Effort Expectancy (EE) and social influence (SI). TCs were measured using Behavioral uncertainty, Asset specificity, Environmental uncertainty; and Transaction frequency.

Table 3: Table showing measurement of variables.

Variable	Construct	Measurement	Reference
Financial Inclusion (FI)	Access	Ownership of a mobile phone, registration for MM, and proximity to MM agents	Demirguc-Kunt, & Klapper, 2013; Bongomin, Munene, Ntayi & Malinga, 2018; Serrao, Sequeira, & Varambally, 2013
	Usage	Regularity, frequency, and MM services used	
	Quality	Tangibility, reliability, responsiveness, assurance, empathy, network quality, and competitive advantage	Al-Aali et al, 2011
Digital financial services (DFSs)	Facilitating conditions (FC)	Perceived credibility (privacy and security)	Sarfaraz & Alzubi, 2017; Venkatesh et.al, 2003
	Performance Expectancy (PE)	The extent to which adopting MM will help a person gain banking performance	
	Effort Expectancy (EE)	The amount of effort required to use the MM services	
	Social influence (SI)	The influence by society and peers on how a person uses MM services	
Transaction Costs (TCs)	Behavioral uncertainty (BU)	The number of prior MM transactions	Pflügler, et al, 2016
	Asset specificity (AS)	Site specificity, physical asset specificity, and human asset specificity based on the individual's knowledge about MM services	
	Environmental uncertainty (EU)	The volume of MM transactions	
	Transaction frequency (TF)	The number of MM transactions within 12 months	

Source: Demirguc-Kunt, & Klapper, 2013; Bongomin, Munene, Ntayi & Malinga, 2018; Serrao, Sequeira, & Varambally, 2013; Sarfaraz & Alzubi, 2017; Venkatesh et.al, 2003 and Pflügler, et al, 2016.

3.7 Validity and Reliability

Before data analysis, the research instrument will be assessed for its reliability as well as validity. Taherdoost (2016) postulates that although reliability is important for the study, it is not sufficient unless combined with validity.

3.7.1 Validity of Research Instruments

Validity means to measure what is intended to be measured and explains how well the collected data covers the actual area of the study (Taherdoost, 2016). This study used construct validity.

3.7.1.1 Construct Validity

Construct validity which has two components (convergent and discriminant validity) refers to how well a construct (concept, idea, or behavior) is translated or transformed into a functioning and operating reality (Taherdoost, 2016). Taherdoost (2016) stipulates that construct validity can be conducted utilizing principal component analysis (PCA) with varimax. The results of factor analysis should satisfy the criteria of construct validity including both the discriminant validity (loading of at least 0.40, no cross-loading of items above 0.40) and convergent validity (eigenvalues of 1, loading of at least 0.40, items that load on posited constructs) (Field, 2013; Taherdoost, 2016).

A principal component analysis with varimax was conducted on the 81 items. The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis as adequate since all KMO values i.e., 0.882, 0.896, and 0.902 for DFSs, TCs, and FI respectively were greater than .77, which is above the acceptable limit of .5 (Field, 2013). All DFSs adoption factors loaded above 0.5 and were considered for further analysis except two items under PE; one with a factor loading of less than 0.5 and another PE1 - using MM improves my performance which cross-loaded under EE (See Appendix 3). In addition, all TCs factors loaded above 0.5 while all FI factors loaded above 0.5 except one item which had a factor loading of less than 0.5 and was not considered for further analysis (See Appendix 4 & 5). The results of the validity test are summarized in table 4 below.

Table 4: Table showing validity test

S/N.	Variables	Items before factor analysis	Items deleted	No. of Questionnaire items retained
1	Digital financial services	21	1	20

2	Transaction costs	29	0	29
3	Financial Inclusion	31	2	29
	Total	**81**	**3**	**78**

Source: Primary data

3.7.2 Reliability

Reliability refers to the repeatability, stability, or internal consistency of a questionnaire (Babbie, 2016). Cronbach's alpha was used to test the reliability of the measures in the questionnaire (Cronbach, 1951). Cronbach's alpha has the most utility for multi-item scales at the interval level of measurement, requires only a single administration, and provides a unique, quantitative estimate of the internal consistency of a scale. A reliability test was carried out with the help of a statistical package for social science (SPSS) which was used to determine the coefficient of reliability. According to Cronbach's Alpha coefficient, a minimum reliability coefficient of 0.7 would be regarded as a reliable and consistent coefficient and any value below 0.7 was deleted (Cronbach, 1951).

Table 5: Table showing Reliability test

Variable	Cronbach's Alpha	No of Items
Digital financial services	.910	20
Transaction costs	.927	29
Financial Inclusion	.913	29

Source: Primary data

Results of Table 5 indicate that items are reliable and consistent since Cronbach's coefficient alpha is; (0.910) for the digital financial services constructs; (0.927) for transaction costs; and (0.913) for the constructs of financial inclusion.

3.8 Data Processing, Presentation, and Analysis

Data from questionnaires were compiled, sorted, edited, classified and coded, and analyzed using SPSS, version 26.0. Descriptive statistics such as frequencies, percentages, mean and standard deviation were used to analyze the objectives of the study. Additionally, Pearson correlation was used to establish the relationship between the study variables; DFSs adoption, TCs, and FI. This study used multiple linear regression to test the statistical significance of the various independent variables on the dependent variable. Nathans (2012) states that multiple linear regression is used where the number of independent variables is more than

one to establish the relationship between the variables and Barron and Kenny (1986) test for mediation.

3.9 Ethical Considerations

The aspects of confidentiality, voluntary participation, and informed consent were given special consideration. The Institutional letter/consideration was used to obtain consent for the use of sensitive data and authorization to carry out the study. Consent was obtained from the district authorities like the Chief Administrative Officer (CAO) and the Resident District Commissioner (RDC) before the study was carried out in Masaka District as shown in appendix 9. Relatedly, questionnaires were designed to exclude the respondent's name, a statement included indicating that strict confidentiality regarding the use of data would be observed and that response was optional. Further, all information summarized from other authors' literature was acknowledged and plagiarism was avoided.

3.10 Limitations of the Study

As in most empirical research, this study had several limitations which created scope for future research.

3.10.1 Period of the data collection

The study data was collected in November and December 2020, a period immediately following the lockdown imposed by the President to control the spread of the COVID – 19 pandemics. During the lockdown and the months following the lifting of some restrictions, the use of digital financial services especially mobile money was encouraged regardless of the costs as a measure to restrict the use of cash which was seen as a means through which the virus could be spread. The collection of data in this period meant that the study responses could have been affected by the advice to use digital financial services compared to the response in normal situations.

3.10.2 Scope of the study

i. Subject scope

The study focused on digital financial services currently adopted in Uganda specifically MM services and ignored other digital financial services channels such as ATMs, agency banking, internet banking, and Fintech. This, therefore, implies that the results of the study cannot be generalized to other DFSs channels.

ii. Geographical scope

The study focused on Masaka thus the findings of the study may not be generalized to other districts in Uganda. Therefore, in future research, it would be logical to elevate the number of districts, hence making the future research generalizable.

3.10.3 Methodology

i. Sample size

The sample size of this study was only 384 respondents; thus, the findings of the study may not be generalized to Uganda as a whole. Therefore, in future research, it would be logical to elevate the sample size and testing of this model extensively, hence making the future research generalizable.

ii. Cross-sectional study

The study adopted a cross-sectional study design which implies that data was collected at a single point in time. Since the study is demand-sided and relates to behavior and attitude towards DFSs which can change over time, a longitudinal study would yield better results since data is collected over some time.

3.10.4 Theoretical framework

i. The unified theory of acceptance and usage of technology (UTAUT)

Only the four direct constructs of the UTAUT i.e., effort expectancy, social influence, facilitating conditions, and performance were applied in the study. However, the original UTAUT which was adopted for the study had eleven (11) constructs i.e., the four direct constructs, gender, age, experience and hedonic motivation, price value, and habit.

ii. The systems theory of financial inclusion (STFI)

The study adopted the STFI to explain FI. However, Ozili (2020) speculates that FI needs to be studied from a theoretical perspective based on the several theoretical perspectives that have been provided. Ozili (2020) further speculates that FI theories have been underutilized in the FI debate.

CHAPTER FOUR

PRESENTATION, ANALYSIS, AND INTERPRETATION OF FINDINGS

4.0 Introduction

This chapter presents the results of the study and their discussion in line with the research objectives. Discussion of the study results was done with the comparison of the study findings with those of related previous research studies. The study results were used to answer the research questions from which the objectives of the study evolved.

The study aimed at establishing the relationship between DFSs adoption, TCs, and FI of Households (HHs) in Masaka District. The objectives of the study were; to examine the relationship between DFSs adoption and FI; to establish the relationship between DFSs adoption and TCs; to determine the relationship between TCs and FI, and to examine the mediating role of TCs on the relationship between DFSs adoption and FI of HHs in Masaka District.

The number of questionnaires administered to all the respondents was 384 and a total of 365 questionnaires were satisfactorily filled and returned which represented an overall response rate of 95%. According to Mugenda and Mugenda (2003), a response rate of 50% or more is adequate. Additionally, Babbie (2016) postulates that there is less chance of significant non-response bias when a high response rate is achieved.

Table 6: Table showing Response rate

Response Rate	Frequency	Percent (%)
Returned	365	95
Unreturned	19	05
Total	**384**	**100**

4.1 Descriptive of the respondents

The researcher found it necessary to gather the background information of the respondents because such information would determine the ability of the respondent to offer reliable information that would help in understanding the responses. Frequency measures were used to analyze the demographic characteristics of the respondents in terms of the gender of the

respondent, age, HH monthly income, HH source of income, number of HH members, and level of education. The frequencies and percentages were meant to establish the most frequently occurring responses and the least frequently occurring responses.

4.1.1 Gender of the respondents

The results in the table below show the gender of the respondent, their frequency, and valid percentages.

Table 7: Table showing gender of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	208	57	57	57
	Female	157	43	43	100
	Total	**365**	**100**	**100**	

Source: Primary data

The respondents were asked to indicate their gender. Table 6 shows that the majority of the respondents, 208 (57%) were males as opposed to females who were 157 (43.0%). This presupposes that generally, the margin between males and female respondents was minimal. This means opinions responses were sought from both males and females therefore any biased based on gender was captured.

4.1.2 Age of the respondents

The results in the table below show the age of the respondent, their frequency, and valid percentages.

Table 8: Table showing the age of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25 years	65	17.8	17.8	17.8
	26-33 years	90	24.7	24.7	42.5
	34-41 years	86	23.6	23.6	66
	42-49 years	69	18.9	18.9	84.9
	50-57 years	55	15.1	15.1	100
	Total	**365**	**100**	**100**	

Source: Primary data

The respondents were asked to indicate their age. Table 8 indicates that the majority of respondents 90 (24.7%) belong to the age group 26-33 years while the minority belonged to the age group 50-57 years with a representation of 54 (14.8%). This implied that the majority age groups are the most active users of the MM service partly because, they are economically

active, and can also easily embrace change hence in a position to use DFSs and to provide reliable information.

4.1.3 Household monthly income

The table below shows the monthly income of the HHs that participated in the study.

Table 9: Table showing household (HH) income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	33	9	9	9
	less than 500,000	154	42.2	42.2	51.2
	500,000- 1,000,000	116	31.8	31.8	83
	1,000,001- 1,500,001	37	10.1	10.1	93.2
	1,500,002-2,000,002	12	3.3	3.3	96.4
	More than 2,000,002	13	3.6	3.6	100
	Total	**365**	**100**	**100**	

Source: Primary data

The respondents were asked to indicate the HH level of income. Table 9 indicated that 91% of the HHs had an income of which the majority of the HHs 154 (42.2%) earn less than 500,000 and the last category was 08 (2.2%) who earn more than 2,000,000. This implied most of the HHs in the study were capable of transacting using MM.

4.1.4 Household (HH) source of income

The table below shows the source of income of the selected HHs that participated in the study.

Table 10: Table showing household (HH) source of Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Formal Employment	185	50.7	50.7	50.7
	Commercial Agriculture	74	20.3	20.3	71
	Business Enterprise	75	20.5	20.5	91.5
	None	26	7.1	7.1	98.6
	Others Specify	5	1.4	1.4	100
	Total	**365**	**100**	**100**	

Source: Primary data

Results from Table 10 above show that 339 (92.9%) of HHs had a source of income while 26 (7.1%) lacked a source of income. The majority of the HHs 185 (50.7%) were formally

employed and the least was 05(1.4%) having other sources of income such as "boda-boda" riding. This implied that most of the HHs in the study had a source of income hence capable of transacting using DFSs.

4.1.5 Number of household (HH) members

The table below shows the number of HH members, the frequencies, and valid percentages.

Table 11: Table showing number of household members

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 3	114	31.2	31.2	31.2
	4 - 6	155	42.5	42.5	73.7
	7 - 9	76	20.8	20.8	94.5
	More than 10	20	5.5	5.5	100
	Total	**365**	**100**	**100**	

Source: Primary data

Results of Table 11 indicate that the majority of the HHs 155 (42.5%) had 4-6 HH members while HH with more than 10 members had the least representation of 20 (5.5%). This implied that most HHs had a manageable number of members hence the ability to save their income and conduct transactions using DFSs, particularly MM. Additionally, since most HHs had more than one (01) member, the possibility of finding a member in the selected HH was high.

4.1.6 Level of education

The table below shows the results of the education level of the respondents.

Table 12: Table showing level of education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	7	1.9	1.9	1.9
	Primary School	19	5.2	5.2	7.1
	Ordinary Level	49	13.4	13.4	20.5
	Advanced Level	41	11.2	11.2	31.8
	Certificate	64	17.5	17.5	49.3
	Diploma	72	19.7	19.7	69
	Bachelor's Degree	92	25.2	25.2	94.2
	Master's degree	17	4.7	4.7	98.9
	PhD	4	1.1	1.1	100
	Total	**365**	**100**	**100**	

Source: Primary data

Results from table 11 show that 358 (98.1%) of the respondents had some form of education. The majority of respondents were holders of bachelor's degrees with 92 (25.2%), followed by

those holding diplomas with 72 (19.7%) indicating that the majority of respondents most likely to DFSs are those that have gone to universities and institutions of higher learning. Additionally, 17 (4.7%) of the respondents are holders of Master's Degree while 4 (1.1%) hold Ph.D.'s. The respondents holding certificates account for 17.5% and those holding A Level, O Level, and Primary account for 11.2%, 13.4%, and 5.2% respectively indicating that most of the majority of the respondents poses the financial capabilities and literacy to use the DFSs and provide informed responses.

4.2 Sampling adequacy

To examine whether the data collected was adequate and appropriate for inferential statistical tests such as the factor analysis, regression analysis, and other statistical tests, two main tests were performed namely; Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Barlett's test of sphericity. For a data set to be regarded as adequate and appropriate for statistical analysis, the value of KMO should be greater than 0.5 while Bartlett's test of sphericity should be significant (i.e., the value of sig. will be less than .05) (Field, 2013).

Table 13: Table showing sampling adequacy tests using KMO and Bartlett's Test

		Digital financial services	**Transaction costs**	**Financial Inclusion**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.882	0.896	0.902
Bartlett's Test of Sphericity	Approx. Chi-Square	4169.603	6815.455	5561.236
	df	210	406	465
	Sig.	0	0	0

Source: Primary data

Findings in Table 17 showed that the KMO statistic was 0.822, 0.896, and 0.902 for DFSs, TCs, and FI respectively which were significantly high; and greater than the critical level of significance of the test which was set at 0.5 (Field, 2013). In addition to the KMO test, the results of Bartlett's test of sphericity were also highly significant ($p < 0.05$) i.e., 0. These results provide an excellent justification for further statistical analysis to be conducted.

4.3 Factor analysis

According to Field (2013), the factor analysis technique is used for identifying clusters of variables and understanding the structure of a set of variables to reduce a large set of data to a smaller subset of measurement variables, therefore, enabling further analysis.

4.3.1 Digital financial services adoption

Factor analysis was used in determining those components of DFSs adoption that have more factor loadings than others. The results from Appendix 5 indicate that effort expectancy (EE) has the highest loading and constitutes 37.7% to DFSs adoption, followed by social influence (SI) with 10.3%, facilitating condition (FC) with 8.6%, and finally performance expectancy (PE) with 6.1%. The findings are supported by Abrahãoa et al (2016) who found that effort expectancy was the greatest determinant of intention to adopt the technology. However, the results of the study contradict Mugambe (2017) who found that social influence had the most significant effect on mobile money usage followed by facilitating conditions.

The most important items of EE include; becoming skillful at using MM is easy (.818) and learning to use MM is easy (.814). This was followed by items such as interacting with MM platforms is easy for me and I find using MM services easy with loadings ranging from 0.787 and 0.545. This indicates that most respondents consider effort expectancy to be more important when adopting DFSs channels.

All factors loaded above 0.5 and were considered for further analysis except one item under PE (i.e., using MM saves my time) since it had a factor loading of less than 0.5. Additionally, an item under PE i.e., PE1 - using MM improves my performance loaded under EE and was categorized as part of EE.

4.3.2 Transaction costs (TCs)

The results show the relative composition of TCs in HHs as seen from the respondents' view. Results from Appendix 6 show that transaction frequency constitutes 33.577% of TCs therefore significantly important in comparison to environmental uncertainty with 13.969%, behavioral uncertainty with 7.395%, and finally asset specificity with 6.041%. The results support Pflügler et al (2016) who observe that environmental uncertainty and transaction frequency have a high descriptive influence on transaction costs while behavioral uncertainty and asset specificity are only of minor significance. However, the study contradicts the findings by Pflügler et al (2016) as the study found that transaction frequency is the most significant determinant of TCS.

The following items were the most significant in measuring TCs; I normally make payments using MM at least once a month and I normally send money using MM at least once a month (.797), I normally receive money using MM at least once a month (.785), and I regularly send

money using MM at least once a month (.767). Other items such as I occasionally send money using MM at least once a month, I occasionally make payments using MM at least once a month and I regularly receive money using MM at least once a month had among others had factor loadings ranging from 0.744 to 0.712.

All factors loaded above 0.5 and were considered for further analysis.

4.3.3 Financial inclusion (FI)

The results from factor analysis show the relative composition of FI in HHs as seen from the respondents' view. Results from appendix 7 show that quality constitutes 30.278% to FI, therefore, indicating significant importance of quality in measuring FI followed by access with 12.663% and usage with 6.641%.

The following items have the corresponding significance in measuring quality. MM agents give prompt service (.748), I feel MM transactions are secure (.729), MM networks are reliable (.725), MM networks are fast (.707), MM agents have operating hours convenient to all (.702), and MM service providers have strong and wide network coverage (.700). Other items such as MM network quality is always good, MM agents know the customer needs, helplines are easily accessible, I feel safe doing business with MM agents, and I feel my privacy is not compromised when I transact with MM among others had factor loadings ranging from 0.690 to 0.520 as shown in appendix 7.

All factors loaded above 0.5 and were considered for further analysis except one item under access (i.e., I have a smartphone that I use to access mobile money services using an app) since it had a factor loading of less than 0.5.

4.4 Relationship between variables

This section presents findings on the correlation between DFSs adoption, TCs, and FI. Tables 16 shows the results of the Pearson correlation coefficient (r) which was computed to study the direction and strength of the relationships between the study variables.

Table 14: Correlations between digital financial services adoption, transaction costs, and financial inclusion

Variables/ Constructs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Digital financial services adoption	1													
2 Effort Expectancy	.791**	1												
3 Social Influence	.739**	.413**	1											
4 Facilitating Condition	.820**	.503**	.432**	1										
5 Performance Expectancy	.765**	.521**	.503**	.515**	1									
6 Transaction Costs	.692**	.553**	.547**	.543**	.515**	1								
7 Transaction Frequency	.405**	.254**	.382**	.268**	.410**	.768**	1							
8 Environmental Uncertainty	.531**	.521**	.336**	.457**	.290**	.690**	.231**	1						
9 Behavioral Uncertainty	.649**	.489**	.505**	.570**	.431**	.807**	.461**	.503**	1					
10 Asset Specificity	.549**	.466**	.428**	.402**	.427**	.730**	.449**	.402**	.509**	1				
11 Financial inclusion	.683**	.609**	.372**	.640**	.459**	.621**	.324**	.572**	.577**	.444**	1			
12 Quality	.598**	.561**	.273**	.606**	.353**	.516**	.171**	.601**	.495**	.356**	.929**	1		
13 Access	.459**	.401**	.380**	.291**	.387**	.423**	.363**	.175**	.318**	.414**	.480**	.265**	1	
14 Usage	.355**	.251**	.240**	.306**	.324**	.380**	.387**	.124*	.347**	.249**	.491**	.182**	.338**	1

Notes: n = 365.
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Source: Primary data

4.4.1 The relationship between digital financial services adoption and financial inclusion

The results from the correlation analysis in table 16 revealed that there is a significant and positive relationship between DFSs adoption and FI ($r = .683$, $p \leqslant 0.01$). This implies that the adoption of DFSs by HHs results in their being financially included. In terms of the constructs of DFSs adoption, effort expectancy and facilitating condition have strong significant positive relationships with FI ($r =. 609$ and $r = .640$ respectively, $p \leqslant 0.01$) while social influence and performance expectancy have weak significant relationships with FI ($r = .372$ and $r = .459$ respectively, $p \leqslant 0.01$). Jack & Suri (2011) postulate that DFSs such as MM enable people who are otherwise excluded from the formal financial system to perform financial transactions in a relatively cheap and secure and reliable manner thus making them financially included.

4.4.2 The relationship between digital financial services adoption and transaction costs

Furthermore, the results also showed that DFSs are strong, significantly, and positively related to TCs ($r = .692$, $p \leqslant 0.01$). This means that the adoption of DFSs by HHs influences TCs. All the DFSs adoption constructs namely; effort expectancy, social influence, facilitating condition, and performance expectancy have relatively strong significant positive relationships with TCs ($r=.553$, $r=.547$, $r=.543$, and $r =.515$ respectively, $p \leqslant 0.01$). DFSs enable HHs to conveniently and affordably access and usage financial services by reducing transport and associated costs, however other costs associated with DFSs adoption arise such as costs associated with environmental and behavioral uncertainty.

4.4.3 The relationship between transaction costs and financial inclusion

Moreover, the results indicated that transaction costs and financial inclusion are significantly and positively correlated ($r = .621$, $p \leqslant 0.01$). This indicates that there is a relationship between transaction costs incurred by HHs and FI. Environmental uncertainty and behavioral uncertainty have strong significant positive relationships with FI ($r =. 572$ and $r =. 577$ respectively, $p \leqslant 0.01$) while transaction frequency and asset specificity have weak significant positive relationships with FI ($r =.324$ and $r=.444$ respectively, $p \leqslant 0.01$).

4.4.4 The mediating role of transaction costs on the relationship between digital financial services adoption and financial inclusion

This section presents findings using multiple regression analysis to show the extent to which digital financial services adoption and transaction costs predict financial inclusion.

4.4.4.1 Tests of statistical assumptions

Several assumptions are made regarding the relationships between the dependent and independent variables which affect the statistical procedure used for multiple regression **(**Hair, Black, Babin & Anderson, 2019). Therefore, for there to be successful regression analysis, there is a need to test for compliance with the statistical assumptions underlying multivariate techniques (Hair et al, 2019; Field, 2013). These assumptions include; Linearity Homogeneity of variance, no multi-collinearity of variables, and normality (Hair et al, 2019; Field, 2013; Pituch & Stevens, 2016).

Linearity represents the degree to which the change in the dependent variable is related to the independent variable (Hair et al., 2019) while Pituch and Stevens (2016) define the homogeneity of variables as equal population variances. Linearity and homogeneity can be assessed using a scatterplot of the values of the residuals against the values of the outcome (zpred vs. zresid) (Field, 2013). Homogeneity holds when the graph funnels out while linearity is broken when there is any sort of curve in the graph (Field, 2013). The results as indicated in appendix 6 show that the statistical assumption of homogeneity of variance is upheld since the graph does not funnel out and there is no curve in the graph indicating linearity between the variables.

Additionally, the assumption of no multi-collinearity between the variables was diagnosed through examining the; simple correlations among the predictors from the correlation matrix; tolerance value (TV) and variance inflation factors (VIF) for the predictors (Pituch & Stevens, 2016). Pituch and Stevens (2016) define multi-collinearity as the condition when there are moderate to high inter-correlations among the predictors. The results indicated that the correlation between the independent variables was less than 0.8 i.e., 0.692, all VIF values were less than 10 and the TV of more than 0.2 i.e., 0.521 which are within the acceptable levels, an indication that there is no multicollinearity as presented in Table 14 below.

Table 15. Table showing correlation, tolerance value (TV), and the variance inflation factor (VIF)

	Collinearity Statistics		Correlation	
	Tolerance	VIF	Digital financial services adoption	Transaction Costs
Digital financial services adoption	0.521	1.920	1.000	0.692
Transaction Costs	0.521	1.920	0.692	1.000

a. Dependent Variable: Financial inclusion
Source: Primary data

Furthermore, Pituch and Stevens (2016) propose a graphical assessment to assess multivariate normality using graphical comparison of the probability–probability plot (P-P plot). Field (2013) proposes that if there is no deviation of the values from the diagonal line of the plot then there is normality. The results of the examination of the PP plots indicated that the three variables were fairly normally distributed since there was no significant deviation of values from the diagonal line as shown in appendix 7.

In conclusion, the tests of assumptions indicate that variables are linear, homogeneity of variance, no multi-collinearity of variables, and normality, therefore there is a basis for regression analysis.

4.4.4.2 Regression analysis

The study used multiple regression analysis to analyze the relationship between a single dependent variable (financial inclusion) and two independent variables (digital financial services and transaction costs) and to test for mediation as shown in the tables (16 and 17) and figure 4.3 below.

Table 16: Table showing multiple regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.637	.151		4.212	.000
	Digital financial services adoption	.514	.054	.485	9.501	.000
	Transaction Costs	.252	.045	.286	5.597	.000
Dependent Variable: Financial inclusion						
	R Square	.509				
	Adjusted R Square	.506				
	Std. Error of the Estimate	.42117				

Source: Primary data

The regression model in table 17 revealed an acceptable fit which indicates that DFSs adoption and TCs can predict FI by an R squared of 0.509 which indicated that changes in the dependent variable (FI) can be attributed to changes in independent variables (DFSs adoption and TCs) by 50.9%. The model also reveals that DFSs adoption is a better predictor of FI than TCs which is the reason why DFSs adoption has a higher beta of .485 as compared to TCs with .286. This, therefore, implies that DFSs adoption attributes such as effort expectancy, social influence, facilitating conditions, and performance expectancy have a greater impact on financial inclusion than TCs attributes such as transaction frequency, environmental uncertainty, behavioral uncertainty, and asset specificity.

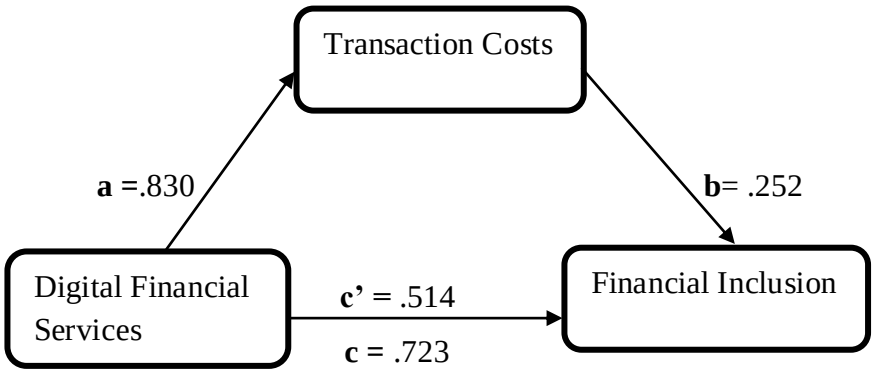
4.4.4.3 The mediation test

To establish the mediating role of TCs on the relationship between DFSs and FI, the study used the conditions advanced by Barron and Kenny (1986). The conditions include; independent variable predicting the dependent variable; the independent variable predicting the mediator; and the independent variable and mediator predicting the dependent variable (Barron & Kenny, 1986). Barron and Kenny (1986) assert that complete mediation is present when the independent variable no longer influences the dependent variable after the mediator has been controlled and all of the conditions are met. Barron & Kenny (1986) further assert that partial mediation occurs when the independent variable's influence on the dependent variable is reduced after the mediator is controlled. The conditions are summarized in models 1, 2, and 3 as indicated in Table 18 below and appendix 8.

Table 17: Table showing the mediation effect of transaction costs on the relationship between digital financial services and financial inclusion

	Financial inclusion Model 1	Transaction costs Model 2	Financial inclusion Model 3
Constant	0.728	0.36	0.637
Direct effect			
Digital financial services	0.723	0.83	
Mediation			
Digital financial services			0.514
Transaction costs			0.252
Sig.	0	0	0

Source: Primary data



Source: Primary data

Figure 4. 1 : Mediation model

The results show a significant but partial decrease in the predictive power of DFSs adoption on FI after introducing the mediating variable (TCs) as shown in model 3. This is further illustrated in figure 4.3 by the decrease in the predictive power from c = .723 to c' = .514 which confirms partial mediation of TCs on the relationship between DFSs adoption and FI.

CHAPTER FIVE

DISCUSSION OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a discussion of findings observed and inferred from the data provided in chapter four. The discussion of findings is based on the Literature review available in chapter two. The discussion presents information about the variables, their comparison, and the results of the research objectives.

5.1 Discussion of findings

The section presents a discussion of findings, conclusions, and recommendations of the study in line with the research objectives.

5.1.1 The relationship between digital financial services adoption and financial inclusion

Pearson's correlation coefficient shows that there is a significant positive relationship between DFSs adoption and FI. This implies that when HHs adopt DFSs, FI increases. That is to say when HHs adopt DFSs channels such as MM and other platforms; they consequently perceive an improvement in the FI dimensions of access, usage, and quality. These findings are consistent with those of scholars such as Ozili (2018) who found that digital finance through Fintech providers has positive effects on FI. Similarly, Munyegera and Matsumoto (2015) also support the findings of the study by contending that the presence of DFSs users such as MM users in the HHs increased the probability of usage of financial services such as saving, borrowing, and receiving remittance thus increasing in FI.

Additionally, the findings indicate that effort expectancy and facilitating condition have strong significant positive relationships with FI while social influence and performance expectancy have weak significant relationships with FI. This implies that users of DFSs consider effort expectancy to be more important in determining FI followed by facilitating conditions. In terms of factor analysis, becoming skillful at using mobile money is easy (0.818) and learning to use mobile money is easy (0.814) under effort expectancy had high factor loadings, an indication that DFSs providers should make the services and user interface friendly, easy to learn and easy to become skillful at using since these can increase DFSs adoption and increase FI.

5.1.2 The relationship between digital financial services adoption and transaction costs

The findings show that there is a significant positive relationship between DFSs adoption and TCs. This means that when DFSs providers introduce new channels and services such as the ATM, internet banking, agency banking, and MM, etc, TCs both indirect and direct resulting from behavioral uncertainty, environmental uncertainty, asset specificity, etc. will consequently increase. These findings are in line with those of Micheni et al (2013) who showed that though the TCs of sending money through mobile payment technology is lower than those of banks, mobile money costs remain a major hindrance to the adoption of MM products. The findings, however, contradict the findings of Bachas et al (2018), and Evans (2018) who found that DFSs lower TCs.

In addition, the results of correlation analysis revealed that all the DFSs adoption constructs namely; effort expectancy, social influence, facilitating condition, and performance expectancy have relatively strong significant positive relationships with TCs which implies that DFSs providers should focus on effort expectancy, social influence, facilitating condition, and performance expectancy to reduce TCs. However, effort expectancy had a higher correlation (0.553) than the other three constructed, an indication of the importance of effort expectancy in reducing TCs as compared to the other constructs.

5.1.3 The relationship between transaction costs (TCs) and financial inclusion (FI)

The findings show a significant positive relationship between TCs and FI. This means that an increase in TCs will bring about an increase in FI. TCs attributes such as transaction frequency, behavioral uncertainty, environmental uncertainty, and asset specificity can have a direct impact on financial inclusion. This finding is consistent with the findings of AFT et at., (2021) who showed that transaction costs may have a positive impact on consumer behavior or usage, therefore, an increase in FI.

Furthermore, correlation analysis indicated that environmental uncertainty and behavioral uncertainty have strong significant positive relationships with FI while transaction frequency and asset specificity have weak significant positive relationships with FI. This implies that users consider environmental uncertainty to be an important determinant of FI followed by behavioral uncertainty.

Moreover, results of factor analysis revealed that changes to services charges affecting the volume, usage, and transaction amount of MM transactions (factor loadings of 0.858, 0.838, and 0.836 respectively) and changes to taxes on MM transactions affecting usage of MM services (0.801) had high factor loadings and therefore important in determining environmental uncertainty. This implies that DFSs providers, Government, and policymakers should devise means and policies to reduce service charges and taxes as these are the most significant determinants of TCs. Items under behavioral uncertainty that had high factor loadings include; I am aware of the services charges for mobile money transactions (0.763) and I am aware of the funds and service charges before I approve a transaction (0.711) an indication of the importance of awareness of services charges and the need to approve transactions with full awareness of both the funds and the service charges related to the transaction. This implies that DFSs providers should ensure that customers have access to transaction service charges such as a display at agent premises and improve processes to ensure that users are notified of transaction amounts and services charges before transaction approval.

5.1.4 The mediating role of transaction costs (TCs) on the relationship between digital financial services (DFSs) adoption and financial inclusion (FI)

The results show that there is a partial mediation as observed from the significant reduction in variance between DFSs and FI explained by the introduction of TCs. This implies that TCs costs reduce the relationship between DFSs and FI. The results of the study are consistent with the UN Capital Development Fund report (2017) which showed that the lack of TCs transparency of DFSs can hinder the adoption and usage of DFSs. Similarly, Suri and Jack (2016) also found that TCs may limit the uptake of DFSs if customers incorrectly perceive the products as too expensive thereby hindering effective FI.

5.2 Conclusion

It was established from the study that there is a significant positive relationship between; DFSs adoption and FI; DFSs and TCs; and TCs and FI. Finally, DFSs adoption and TCs are significant predictors of FI. The following was established from the results of the study;

Firstly, the significant relationship between DFSs adoption and FI indicates that DFSs providers should enhance the attributes of DFSs adoption such as effort expectancy, facilitating conditions, and performance expectancy which will enable customers to

experience better financial services thereby increasing FI. Additionally, customer experience should be improved to enable the enhancement of the social influence of potential customers by existing customers. Furthermore, since effort expectancy is the most significant in determining DFSs adoption, DFSs providers should enhance features and services to reduce the user efforts when using DFSs platforms.

Secondly, DFSs have a significant positive relationship with TCs, therefore dimensions of TCs such as transaction frequency, environmental uncertainty, behavioral uncertainty, and asset specificity should not be ignored in an attempt to obtain increased DFSs adoption. Additionally, transaction frequency is seen as the most significant component of TCs therefore charges and taxes related to MM services and transactions should be lower as they are likely to impact transaction frequency thereby affecting adoption and usage.

Thirdly, TCs have a direct relationship with FI, therefore attributes such as transaction frequency, behavioral uncertainty, environmental uncertainty, and asset specificity directly influence access, usage, and the quality of financial services. This means that providers should consider reducing charges related to transactions, developing features and services that, reduce behavioral uncertainty and environmental uncertainty. Additionally, DFS providers should develop alternative products that substitute services with high transaction costs like withdrawals, for instance, strategies should be devised to increase the number of businesses with merchant codes since payments attract fewer service charges compared to withdrawals which would encourage customers to keep the money on the phones to make payments than withdrawing cash. Furthermore, since behavioral uncertainty is a significant determinant of FI, new products such as automated teller machines for mobile money services should be introduced to enable consumers to deposit and withdraw funds from their phones without interacting with agents.

Furthermore, Since TCs have a significant mediating effect on the relationship between DFSs adoption and FI, efforts have to be made by financial services providers to consider the effect of; charges/fees on transaction frequency; new DFSs channels and products on environmental uncertainty, behavioral uncertainty and asset specificity on effort expectancy, social influence, asset specificity, and performance expectancy to increase FI.

Lastly, since DFSs adoption and TCs are significant predictors of FI and DFSs adoption is a better predictor of FI than TCs, DFSs providers should concentrate on providing DFSs and

enhancing customers'; effort expectancy; social influence; facilitating conditions; performance expectancy.

5.3 Recommendations

5.3.1 Financial service providers

The researcher recommends that DFSs providers such as Banks and Mobile Network Operators (MNO) should make an effort to develop new products and services aimed at improving DFSs attributes such as effort expectancy, social influence, facilitating conditions, and performance expectancy to provide better quality services thus bring about increase in FI. If attributes of DFSs adoption are not considered, customers will likely fail to adopt the DFSs hence affecting the desired increase in FI.

Bank, MNO, and other DFSs providers in Uganda should emphasize the reduction of TCs specifically charges in their attempt to increase FI through the use of DFSs channels such as the MM, agency banking, ATM, and internet banking. Reducing TCs enhances customers' access and usage of DFSs which will increase FI.

Bank, MNO, and other DFSs providers in Uganda should emphasize enhancing the quality (which constitutes 30.278% to FI) in their attempt at achieving increase access and usage of financial services through the use of DFSs channels such as MM, agency banking, ATM, and internet banking. Fostering service quality, in turn, enhances better customer satisfaction thus creating more loyal and committed customers who act as brand ambassadors. Through social influence which is the second most significant predictor of DFSs adoption (constitutes 10.332% of DFSs adoption), customers will inform and/or influence other customers who later will adopt the DFSs and thus increase FI.

5.3.2 Government and policymakers

Financial sector regulators should evolve policies that require financial services providers to spread to more areas, especially through DFSs. This should include speeding up the development of an implementation roadmap for expanding financial services access points to unbanked and under-served areas based on the national financial services geospatial map. This will overcome the identified challenges of distance, cost, and access by the rural populace.

Regulators and policymakers should consider the removal of regulatory barriers that hinder the usage of the internet and mobile phones, improve financial service processes, reduce costs

and promote FI through regulatory changes. This should enable the successful adoption of the internet and mobile phones in digital finance and the usage of new technologies that can benefit HHs.

There is a need for Government to develop policies such as tax policies that do not increase TCs of DFSs. Since transaction frequency constitutes 33.577% of TCs, increasing charges by increasing taxes would reduce the frequency of transactions thus impacting the usage of DFSs and ultimately reducing FI.

5.3.3 Researchers

Future researchers should conduct detailed studies on theories of FI that have largely not been seen in previous studies on FI. Ozili (2020) points at FI literature may become porous and disconnected if there are no set of coherent theories of FI to prescribe some general principles that explain financial inclusion practice. The study, therefore, recommends further study into the theories of FI such as the systems theory of financial inclusion.

Additionally, the study recommends a more comprehensive longitudinal study utilizing all the DFSs adoption constructs and DFSs adopted in Uganda with a larger country-wide sample to enable the generalization of the findings.

5.4 Areas for further research

The emphasis of the study was placed on DFSs adoption, TCs, and FI of households (HHs) in Masaka District, however, further research can be done concerning the following area;

i. Digital Financial Services, Financial Inclusion and the Growth of SME in Uganda.

ii. Digital financial services adoption and profitability of banks in Uganda.

iii. Facilitating conditions, transactions costs, and financial inclusion in Uganda

iv. Digital financial services adoption, Transaction Costs, and Financial Inclusion: A case of Banks in Uganda

REFERENCES

Abrahãoa, R.S., Moriguchib, S.N., & Andradeb, D.F. (2016). The intention of adoption of mobile payment: An analysis in the light of the Unified Theory of Acceptance and Use of Technology (UTAUT). RAI Revista de Administração e Inovação. 13, 221–230.

African Development Bank (ADB) (2016) Accelerating Financial Inclusion in South-East Asia with Digital Finance. *Technical report*. Asian Development Bank.

Aduda, J., Kiragu, D., & Ndwiga, J.M. (2013.). The relationship between agency banking and financial performance of commercial banks in Kenya.

Agyekum, F, S. Locke & N. Hewa-Wellalage (2017). Financial Inclusion and Digital Financial Services: Empirical evidence from Ghana. *Munich Personal RePEc Archive*. MPRA Paper No. 82885.

Al-Aali, A., Khurshid, K.A., Nasir, N.M., Al-Aali, H. (2011). Measuring the Service Quality of Mobile Phone Companies in Saudi Arabia. J. *King Saud Univ*., Vol. 22, Admin. Sci. (2), pp. 43-55.

Alliance for Financial Inclusion (AFI), Kijang, S., Jalan Dato' Onn, J. (2021). Regulatory approaches to digital payments transaction costs in sustaining financial inclusion in Africa. *Alliance for Financial Inclusion, 50480 Kuala Lumpur, Malaysia*.

Alliance for Financial Inclusion (AFI) (2016). Indicators of the Quality Dimension of Financial Inclusion. FID Guideline Note No. 22. Kuala Lumpur, Malaysia.

Alliance for Financial Inclusion (AFI) (2013). Defining and Measuring Financial Inclusion. *Financial inclusion in Africa. African Development Bank (AfDB) African Development Bank Group*, pg. 31 – 42.

Alkailani, M. (2016). Factors affecting the adoption of internet banking in Jordan: An extended TAM model. *Journal of Marketing development and competitiveness*. Vol. 10(1).

Amin, M. E. (2005). Social Science Research: Conception, Methodology, and Analysis. *Makerere University Printery*, Kampala, Uganda.

Babbie, E. (2016). *The Practice of Social Research*, 14th Ed., Cengage Learning, Boston, MA, USA.

Bachas,P., Gertler, P., Higgins, S. & Seira, E (2018). Digital Financial Services Go a Long Way: Transaction Costs and Financial Inclusion. *AEA Papers and Proceedings*, 108: 444–448.

Baike, P (2018). *Mobile money champions basic financial inclusion*, the new vision Monday 22nd October 2018 pg. 45.

Bank of Uganda (2020). Data statistics of mobile money. https://www.bou.or.ug/bou/bouwebsite/bouwebsitecontent/PaymentSystems/DataStatistics-/Mobile-Money-Statistics.xlsx, accessed on 6th December 2021 at 06:25 am

Bank of Uganda (BOU). (2017). National Financial inclusion strategy 2017 - 2022(2017), *Author*, Kampala, Uganda.

Baron, R. and Kenny, D. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 51. 1173-1182. 10.1037//0022-3514.51.6.1173.

Bhatiasevi, V. (2016). An extended UTAUT model to explain the adoption of mobile banking. *Information Development*. Vol. 32(4) 799–814.

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices*, 2nd Ed. Tampa, Florida, USA.

Bongomin, G.O.C, Munene J.C, Ntayi, J.M & Malinga C.A. (2018). Financial intermediation and financial inclusion of the poor: Testing the moderating role of institutional pillars in rural Uganda. *International Journal of Ethics and Systems*, Vol. 34 Issue: 2, pp.146-165.

Busharizi, P (2019). *MTN mobile money to change the financial landscape*, the New Vision Thursday 30th May 2019, pg. 9.

Caruana, J. (2016). Financial inclusion and the fintech revolution: implications for supervision and oversight. *Conference Remarks at the Third GPFI-FSI Conference on Standard-Setting Bodies and Innovative Financial Inclusion* - New frontiers in the supervision and oversight of digital financial services. 26 October, Basel.

Center for financial inclusion at Accion (2018). *Financial inclusion Glossary*. https://www.Centerforfinancialinclusion.org/financial-inlusion-glossary#:~:test=A%20state%20in%20which%20all,with%20dignity%20for%20the%20clients (accessed on 03/07/2020 at 19:45).

CGAP (2015). Brief Digital Financial Inclusion Implications for Customers, Regulators, Supervisors, and Standard-Setting Bodies. https://www.cgap.org/sites/default/files/Brief-Digital-Financial-Inclusion-Feb-2015.pdf (accessed on 02/07/2020 at 14:01).

Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, Vol. 16 No. 3, pp. 297-334.

Demirguc-Kunt, A and L. Klapper. (2013). Measuring Financial Inclusion: Explaining variations in the use of financial services across and within countries. *Bookings papers on economic Activity*, pg. 279 – 321.

Demirguc-Kunt, A., L. Klapper and D. Singer. (2017a). Financial Inclusion and Inclusive Growth; A Review of Recent Empirical Evidence. *World Bank Group Policy Research Working Paper* (8040).

Demirguc-Kunt, A., L. Klapper, D. Singer, S. Ansar and J. Hess. (2017b). The Global Findex Database, 2017: Measuring Financial Inclusion and the Fintech Revolution. *World Bank publication*, ISBN (paper): 978-1-4648-1259-0.

Dupas, P., and J. Robinson (2013). Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya. *American Economic Journal: Applied Economics*, 5, 163–92.

Dwivedi Y.K., N. P. Rana, A.Jeyaraj, M. Clement & M. D. Williams. (2017). Re-examining the Unified Theory of Acceptance and Use of Technology (UTAUT): Towards a Revised Theoretical Model. *Inf Syst Front.* DOI 10.1007/s10796-017-9774-y.

European Investment Bank (EIB), (2014). Digital Financial Services in Africa: Beyond the Kenyan Success Story.

Evans, O. (2018). Connecting the poor: the internet, mobile phones and financial inclusion in Africa. *Digital Policy, Regulation, and Governance*, Vol. 20 Issue: 6, pp.568-581.

Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics*, 4th Ed., SAGE Publications Ltd, Canada.

Financial Inclusion Insight (FII). (2018). Uganda wave 5 report: Fifth annual FII tracker survey. Intermedia.

Financial Inclusion Insight (2012). Mobile Money in Uganda: Use, Barriers, and Opportunities. *The Financial Inclusion Tracker Surveys Project, October 2012.*

Financial Sector Deepening Uganda. (2018a). Topline findings report. Kampala: Financial Sector Deepening Uganda.

Financial Sector Deepening Uganda. (2018b). Report on banking and the status of financial inclusion in Uganda: Insights from FinScope 2018 Survey. *Financial Sector Deepening, Banking and Financial Inclusion in Uganda*.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. *Addison-Wesley Publication Company*.

Gomber, P., Koch, J. A., & Siering, M. (2017). Digital Finance and FinTech: current research and future research directions. *Journal of Business Economics*, 67(5) 537–580.

GSMA. (2014). State of the Industry report on Mobile financial services for the unbanked.

Haider, H. (2018) Innovative Financial Technologies to Support Livelihoods and Economic Outcomes. *K4D Helpdesk Report*. Brighton, UK: Institute of Development Studies.

Hair, J.F.J., Black, W.C., Babin, B.J., & Anderson, R.E. (2019). *Multivariate Data Analysis*, 8th Ed., Cengage Learning, United States.

Harihareswara, N., Kwebiiha, Z.J., Ogba, U., Duijnhouwer, A., & Favrichon, M. (2017). State of the Digital Financial Services Market 2017: Results from the UNCDF-MM4P Annual Provider Survey. *UNCDF MM4P*.

Hieltjes, E.H. and Petrova. E. (2013). The impact of financial literacy and transaction costs on bank account uptake and use: A Randomized Controlled Trial in Ethiopia. *Master's Thesis in Economics, fall 2013, Stockholm School of Economics.*

Hossain, M.A. (2019). Understanding customers' purchase behavior from online group buying websites: a transaction cost approach. *Australasian Conference on Information Systems Hossain*, Perth Western Australia.

International financial corporation (IFC) (2018). Digital access: The future of financial inclusion in Africa. World Bank Group.

Kalenzi, C. and Kwon, Y. (2018). Digital Finance Revolution in E. Africa: Retail Bank's Adaption to a changing Marketplace, The 22nd Biennial Conference of the International Telecommunications Society: "Beyond the boundaries: Challenges for business, policy, and society", June 24th - 27th, 2018, Seoul, Korea, International Telecommunications Society (ITS), Seoul.

Katusiime, L (2021). Mobile Money Use: The Impact of Macroeconomic Policy and Regulation. Economies 9: 51. https://doi.org/10.3390/economies90200

Karlan, D., Ratan, A.L. & Zinman, J. (2013). Savings by and for the Poor: A Research Review and Agenda. *Economic Growth Center Discussion Paper no. 1027, Yale University* Economics Department Working Paper no. 118.

Krejcie, R.V. and Morgan, D.W. (1970), Determining Sample Size for Research Activities, Educational and Psychological Measurement, *Sage Publications*, Thousand Oaks, CA, USA.

Lees, A., and Akol, D. (2021). There and Back Again: The Making of Uganda's Mobile Money Tax. *ICTD Working Paper 123*.

Malinga, R. B., Maiga G., Jehopio P., and Kareyo M. (2016). Determinants of mobile money services adoption by traders in Uganda. *International Journal of Multidisciplinary Research and Development*. Vol. 4, Issue 8, Pg. 189-201, Online ISSN: 2349-4182, Print ISSN: 2349-5979.

Mawejje, J and Lakuma, P. (2019). Macroeconomic effects of Mobile money: evidence from Uganda. Financial Innovation (2019) 5:23 https://doi.org/10.1186/s40854-019-0141-5.

Micheni, E.M., Lule, I, & Muketha G.M (2013). Transaction Costs and Facilitating Conditions as Indicators of the Adoption of Mobile Money Services in Kenya. *International Journal of Advanced Trends in Computer Science and Engineering (IJATCSE)*, Vol.2, No.5, ISSN 2278 – 3091, pp. 09-15.

Mindra, R.K and Moya, M. (2017). Social Networks and Subjective Norms: The Mediating effect of financial self-efficacy on Financial Inclusion. *Makerere Business Journal* Vol. 13, Issue 1, pp 1-26

Mugambe, P. (2017). UTAUT Model in Explaining the Adoption of Mobile Money Usage by MSMEs' Customers in Uganda. *Advances in Economics and Business*. 5(3): 129-136.

Munyegera, G.K. and Matsumoto, T (2015). ICT for Financial Inclusion: Mobile Money and the Financial Behavior of Rural Households in Uganda. *National Graduate Institute for Policy Studies*, GRIPS Discussion Paper, 15-20.

Natamba, B., P. Mangeni, Z. Nakabuye, B. Akankunda & E. Agasha. (2013). Transaction costs and outreach of microfinance institutions in Uganda. *Issues in Business Management and Economics,* Vol.1 (6), ISSN 2350-157X, pp. 125-132.

Odele, S., Okao, S.A. and Ndiwalana, F. (2017). Agency Banking in Uganda: An Assessment of the potential challenges and opportunities. *Financial Sector Deepening (fsduganda)*.

Okello, G.C.B, Munene, J.C., Ntayi, J.M. & Malinga, C.A. (2018). Financial intermediation and financial inclusion of the poor: testing the moderating role of institutional pillars in rural Uganda. *International Journal of Ethics and Systems*. https://doi.org/10.1108/IJOES-07-2017-0101

Ouma, S.A., Odongo, T.M., & Were, M. (2017). Mobile financial services and financial inclusion: Is it a boon for savings mobilization? Rev. Dev. Finance, http://dx.doi.org/10.1016/j.rdf.2017.01.001.

Ozili, P.K. (2018). Impact of Digital Finance on Financial Inclusion and Stability. *Munich Personal RePEc Archive*, MPRA Paper No. 84771.

Ozili, P.K. (2020). Theories of financial inclusion. *SSRN Electronic Journal*. https//ssrn.com/abstract=3526548 (accessed on 10th April 2020 at 16:55).

Pazarbasioglu, C., Mora, A.G., Uttamchandani, M., Natarajan, H., Feyen, E., and Saal, M. (2020). Digital financial services. *World Bank group*.

Pflügler, C., Wiesche, M. and Krcmar, H. (2016). The Explanatory Power of the Constructs of Transaction Cost Economics Theory. *International Research Workshop on IT Project Management*. 2016. 12.

Pituch, K. A. and Stevens, J.P. (2016). *Applied Multivariate Statistics for the Social Sciences: Analyses with SAS and IBM 's SPSS*, 6th ed., Routledge, New York, United States.

Rahi S. (2017). Research Design and Methods: A Systematic Review of Research Paradigms, Sampling Issues and Instruments Development. *International Journal of Economics Management Sciences*. 6: 403.

Schaner, S (2013). The Cost of Convenience, Transaction Costs, Bargaining Power, and Savings Account Use in Kenya. *Working Paper (August 14)*, Dartmouth University.

Sharma, R, and Mishra, R (2014). A Review of Evolution of Theories and Models of Technology Adoption. *IMJ*. Volume 6 Issue 2.

Sebudde, R.K., Goffe, V., Daka, D., Safavian, M.S. (2017). Step by step: Let's solve the finance puzzle to accelerate growth and shared prosperity (English). *Uganda economic update*. No. 8. Washington, D.C.: World Bank Group.

Serrao, M.V., Sequeira, A. H. and Varambally, K.V. M. (2013). Conceptual Framework to Investigate the Accessibility and Impact of Financial Inclusion. *Indian Journal of Research,* Vol. 2, Issue 9, ISSN - 2250-1991.

Sarfaraz, J., M. Alzubi (2017). Unified Theory of Acceptance and Use of Technology (UTAUT) Model-Mobile Banking. *Journal of international banking and commerce*.

Suri, T., and Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science*. 354(6317), 1288-1292. DOI: 10.1126/science. aah5309.

Taherdoost, H. (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. International Journal of Academic Research in Management (IJARM). Vol. 5, No. 3, Pg: 28-36, ISSN: 2296-1747.

The Collaboration on International ICT Policy for East and Southern Africa (CIPESA) (2018). National Information Technology Survey 2017/18 Report, NITA Uganda, Kampala Uganda.

Tobbin P. Adoption of Mobile Money transfer Technology: Structural Equation Modelling Approach, 2011. www.iiste.org/Journals/index.php/EJBM/article/download/593/483.

Uganda Bureau of Statistics (UBOS) (2017). *National Population and Housing Census 2014 Area Specific Profiles - Masaka District.* Kampala: Uganda Bureau of Statistics.

Uganda communication commission (UCC) (2015). Mobile Platform Access for USSD-based Applications (MPA-USSD) - Market Assessment. Cartesian Ltd. Registered in England and Wales.

Ulwodi, D. W., & Muriu, P. W. (2017). Barriers of Financial Inclusion in Sub-Saharan Africa. *Journal of Economics and Sustainable Development, Vol.8,* (2222-1700).

Vasiliauskiene, L. (2011). Measurement of Transaction Costs in Information Technology Outsourcing. *Intellectual Economics.* Vol. 5, No. 4(12), p. 590–601, ISSN 1822-8011.

Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F.D. (2003). User acceptance of information technology: Towards a unified view. *MIS Quarterly*. 27(3) (2003) 425-478.

Wieser, C., Bruhn, M., Kinzinger, J., Ruckteschler, C. & Heitmann, S. (2019). The Impact of Mobile Money on Poor Rural Households: Experimental Evidence from Uganda. *World Bank Policy Research Working Paper* (8913).

World Bank (2016). Enabling digital development, Digital finance. *World Development Report2016*.http://documents.worldbank.org/curated/en/896971468194972881/310436360_20160263021313/additional/102725-PUB-Replacement-PUBLIC.pdf (accessed on 02/07/2020 at 14:10).

Yan, S. and Yiping H. (2016). Introduction to the special issue: Internet finance in China. *China economic journal*. Vol. 9, Issue 3, pg. 221 – 224.

Yousuf, A. (2017). Transaction Costs: A Conceptual Framework. *International Journal of Engineering and Management Sciences (IJEMS).* Vol. 2. No. 3.

Zhengchao, L., Qin, L., & Pan, W. (2012). Literatures Review on Transaction Costs Measurement Advances. *Asian Social Science*. Vol. 8, No. 12; 2012, ISSN 1911-2017.

APPENDICES

Appendix 1: Questionnaire

MAKERERE UNIVERSITY

MAKERERE UNIVERSITY BUSINESS SCHOOL

Dear respondent,

I am **Aboke Emmanuel Eugene,** a student of **Makerere University** at **Makerere University Business School,** pursuing a post-graduate study for the award of Masters of Business Administration. I am currently researching **digital financial service adoption, transaction costs, and financial inclusion**. I humbly request you to spare a few minutes to fill this questionnaire to enable me to accomplish this task. The information that you will provide will be treated with the utmost confidentiality and under no circumstances will it be personalized. The discussions here deal with general patterns and in no way, require sensitive issues. Please answer all the questions.

SECTION A	**Background Information of respondent**				
Gender	(1). Male	☐	**Number of house-hold members**	(1). 1 – 3	☐
	(2). Female	☐		(2). 4 – 6	☐
Age	(1). 18 - 25 years	☐		(3). 7 – 9	☐
	(2). 26 – 33 years	☐		(4). More than 10	☐
	(3). 34 – 41 years	☐	**Level of Education**	(1). None	☐
	(4). 42 – 49 years	☐		(2). Primary school	☐
	(5). 50 – 57 years	☐		(3). Ordinary level	☐
	(5). Above 57 years	☐		(4). Advanced level	☐
Household monthly income (UGX.)	(1). None	☐		(5). Certificate	☐
	(2). Less than 500,000	☐		(6). Diploma	☐
	(3). 500,000 – 1,000,000	☐		(7). Bachelor degree	☐
	(4). 1,000,001 – 1,500,001	☐		(8). Master degree	☐
	(5). 1,500,002 – 2,000,002	☐		(9). Ph.D.	☐
	(6). More than 2,000,002	☐		(10). Others specify	☐
House-hold source of income	(1). Formal employment	☐		_____	
	(2). Commercial	☐			
	(3). Business enterprise	☐		_____	
	(4). None	☐			
	(5). Others specify _____	☐			
RATING SCALE	**SD=strongly disagree= (1), D=Disagree= (2), N=Not sure (3), A=Agree (4), SA=Strongly agree (5).**				

SECTION B	**Financial Inclusion** *Financial inclusion is the access and effective use of various financial services which starts with the ownership of a deposit or transaction account at a formal financial institution or a mobile money service provider and can be used to make and receive payments, save, access credit and use formal insurance*					
Access		**SD**	**D**	**N**	**A**	**SA**
AC1	I have a mobile phone which I use to access mobile money	1	2	3	4	5
AC2	I have a smart phone which I use to access mobile money services using an app	1	2	3	4	5
AC3	I have a registered mobile money account	1	2	3	4	5
AC4	I live within 1km of a mobile money agent	1	2	3	4	5
AC5	There is a usable access road to the nearest mobile money agent	1	2	3	4	5
Usage		**SD**	**D**	**N**	**A**	**SA**
US1	I regularly use my mobile money account to save	1	2	3	4	5
US2	I regularly received money using my mobile money	1	2	3	4	5
US3	I regularly make payments using my mobile money	1	2	3	4	5
US4	I regularly send money using my mobile money	1	2	3	4	5
US5	I regularly transfer funds from my bank account to my mobile money account	1	2	3	4	5
US6	I regularly borrow using my mobile money account	1	2	3	4	5
Quality		**SD**	**D**	**N**	**A**	**SA**
	Tangibles					
QU1	Mobile money agents are located in convenient places	1	2	3	4	5
QU2	I am issued with a receipt after mobile money transactions	1	2	3	4	5
QU3	I get statements of my transactions on mobile money	1	2	3	4	5
QU4	Mobile money agent premises are well organised	1	2	3	4	5
QU5	Mobile money agents have up-to-date	1	2	3	4	5
	Reliability					
QU6	Mobile money service providers show sincere interest in solving customer problems	1	2	3	4	5
QU7	Mobile money networks are reliable	1	2	3	4	5
QU8	Mobile money agents are available every	1	2	3	4	5
QU9	Help lines are easily accessible	1	2	3	4	5
	Responsiveness					
QU10	Mobile money networks are fast	1	2	3	4	5

QU11	Mobile money agents give prompt service	1	2	3	4	5
QU12	Mobile money service providers have strong and wide network coverage	1	2	3	4	5
QU13	I get prompt feedback and notifications about my mobile money transactions	1	2	3	4	5
QU14	Mobile money network quality is always good	1	2	3	4	5
	Assurance					
QU15	Mobile money agents can be trusted	1	2	3	4	5
QU16	I feel safe doing business with mobile money agents	1	2	3	4	5
QU17	I feel mobile money transactions are secure	1	2	3	4	5
QU18	I feel my privacy is not compromised when I transact with mobile money	1	2	3	4	5
	Empathy					
QU19	Mobile money agents have operating hours convenient to all	1	2	3	4	5
QU20	Mobile money agents know the customer needs	1	2	3	4	5
SECTION C	**Digital financial services adoption** *Digital financial services include automated teller machines (ATMs) cards, mobile money, online banking, and digital credit.*					
Facilitating conditions		**SD**	**D**	**N**	**A**	**SA**
FC1	Agents and network coverage are available for me to use mobile money.	1	2	3	4	5
FC2	Mobile money is convenient to use.	1	2	3	4	5
FC3	Mobile money is very useful in managing my finances.	1	2	3	4	5
FC4	I believe my mobile money information is kept confidential	1	2	3	4	5
FC5	I believe my mobile money transactions are secured	1	2	3	4	5
FC6	I believe my privacy on mobile money platforms is not revealed	1	2	3	4	5
Performance Expectancy		**SD**	**D**	**N**	**A**	**SA**
PE1	Using Mobile money improves my performance	1	2	3	4	5
PE2	Using mobile money saves my time	1	2	3	4	5
PE3	I use mobile money any where	1	2	3	4	5
PE4	I find mobile money useful	1	2	3	4	5
PE5	I find mobile money convenient to use	1	2	3	4	5
PE6	Using mobile money helps me avoid losing important activities.	1	2	3	4	5
Effort Expectancy		**SD**	**D**	**N**	**A**	**SA**
EE1	Learning to use mobile money is easy	1	2	3	4	5
EE2	Becoming skillful at using mobile money is easy	1	2	3	4	5

EE3	Interacting with mobile money platforms is easy for me	1	2	3	4	5
EE4	I find using mobile money services easy	1	2	3	4	5
Social influence		**SD**	**D**	**N**	**A**	**SA**
SI1	People who are important to me think that I should use mobile banking.	1	2	3	4	5
SI2	People who influence my behavior think that I should use mobile banking.	1	2	3	4	5
SI3	Most people surrounding me use mobile money.	1	2	3	4	5
SI4	Most of my friends and relatives use mobile money	1	2	3	4	5
SI5	Most people I do business with use mobile money.	1	2	3	4	5
SECTION D	**Transaction costs** *Transaction costs are defined as the cost of carrying out a transaction. Transaction costs include the cost of information gathering, time and distance costs of accessing formal banking services.*					
Behavioral uncertainty		**SD**	**D**	**N**	**A**	**SA**
BU1	There are adequate safeguards to prevent manipulation by mobile money agents	1	2	3	4	5
BU2	I am aware of the funds and service charges before I approve a transaction	1	2	3	4	5
BU3	I am aware of the services charges for mobile money transaction	1	2	3	4	5
BU4	I am informed of service charges before transactions are made	1	2	3	4	5
BU5	Mobile money charges are displayed at the agent's premises	1	2	3	4	5
BU6	I am required to approve transactions before they are completed.	1	2	3	4	5
BU7	I get prompt information about the transactions I make.	1	2	3	4	5
Asset specificity		**SD**	**D**	**N**	**A**	**SA**
AS1	I do not waste time or transport costs because there are mobile money agent outlets in my	1	2	3	4	5
AS2	Learning to use mobile money platforms does not cost me anything	1	2	3	4	5
AS3	I am not required to purchase a new phone to use mobile money services	1	2	3	4	5
AS4	I am not required to purchase a new sim card to use mobile money services	1	2	3	4	5
AS5	I am not required to purchase a new phone to use mobile money apps.	1	2	3	4	5

AS6	It doesn't cost me anything to register for mobile money services	1	2	3	4	5
Environmental uncertainty		**SD**	**D**	**N**	**A**	**SA**
EU1	Mobile money services are reliable	1	2	3	4	5
EU2	Mobile money services perform as well as they are supposed to	1	2	3	4	5
EU3	Mobile money services perform as well as other digital financial services.	1	2	3	4	5
EU4	Changes to services charges do not affect my usage of mobile money services.	1	2	3	4	5
EU5	Changes to taxes on mobile money transactions do not affect my usage of mobile money	1	2	3	4	5
EU6	Changes to services charges do not affect the volume of my mobile money transactions.	1	2	3	4	5
EU7	Changes to services charges do not affect the transaction amount of my mobile money transactions.	1	2	3	4	5
Transaction frequency		**SD**	**D**	**N**	**A**	**SA**
TF1	I regularly make payments using mobile money **at least once a month**.	1	2	3	4	5
TF2	I normally make payments using mobile money **at least once a month**.	1	2	3	4	5
TF3	I occasionally make payments using mobile money **at least once a month**.	1	2	3	4	5
TF4	I regularly send money using mobile money **at least once a month**.	1	2	3	4	5
TF5	I normally send money using mobile money **at least once a month**.	1	2	3	4	5
TF6	I occasionally send money using mobile money **at least once a month**.	1	2	3	4	5
TF7	I regularly receive money using mobile money **at least once a month**.	1	2	3	4	5
TF8	I normally receive money using mobile money **at least once a month**.	1	2	3	4	5
TF9	I occasionally receive money using mobile money **at least once a month**.	1	2	3	4	5

Appendix 2: Krejcie & Morgan's Table for determining sample size for a given population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

N is the population size
S is the sample size

Source: Krejcie & Morgan (1970)

Appendix 3: Table showing Factor Analysis for Digital Financial Services Adoption

Rotated Component Matrix

	Component			
	Effort Expectancy	**Social influence**	**Facilitating Condition**	**Performance Expectancy**
Becoming skillful at using mobile money is easy	0.818			
Learning to use mobile money is easy	0.814			
Interacting with mobile money platforms is easy for me	0.787			
I find using mobile money services easy	0.694			
Using Mobile money improves my performance	0.545			
People who influence my behavior think that I should use mobile banking.		0.79		
People who are important to me think that I should use mobile banking.		0.779		
Most people surrounding me use mobile money.		0.768		
Most of my friends and relatives use mobile money		0.756		
Most people I do business with use mobile money.		0.72		
I believe my mobile money transactions are secured			0.834	
I believe my mobile money information is kept confidential			0.824	
I believe my privacy on mobile money platforms is not revealed			0.752	
Agents and network coverage are available for me to use mobile money.			0.612	
Mobile money is very useful in managing my finances.			0.611	
Mobile money is convenient to use.			0.505	
I find mobile money useful				0.757
I find mobile money convenient to use				0.689
I use mobile money anywhere				0.643
Using mobile money helps me avoid losing important activities.				0.639

Eigen value	7.917	2.17	1.796	1.287
Variance%	37.701	10.332	8.553	6.13
Cumulative variance %	**37.701**	**48.033**	**56.586**	**62.716**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Source: primary data

Appendix 4: Table showing Factor Analysis for Transaction costs

	Component			
	Transaction frequency	**Environmental uncertainty**	**Behavioral uncertainty**	**Asset Specificity**
I normally make payments using mobile money at least once a month.	0.797			
I normally send money using mobile money at least once a month.	0.797			
I normally receive money using mobile money at least once a month.	0.785			
I regularly send money using mobile money at least once a month.	0.767			
I occasionally send money using mobile money at least once a month.	0.744			
I occasionally make payments using mobile money at least once a month.	0.743			
I regularly receive money using mobile money at least once a month.	0.730			
I occasionally receive money using mobile money at least once a month.	0.719			
I regularly make payments using mobile money at least once a month.	0.712			
Changes to services charges do not affect the volume of my mobile money transactions.		0.858		
Changes to services charges do not affect my usage of mobile money services.		0.838		
Changes to services charges do not affect the transaction amount of my mobile money transactions.		0.836		
Changes to taxes on mobile money transactions do not affect my usage of mobile money services.		0.801		
Mobile money services perform as well as other digital financial services.		0.596		
Mobile money services perform as well as they are supposed to		0.595		

Mobile money services are reliable		0.556		
I am aware of the services charges for mobile money transaction			0.763	
I am aware of the funds and service charges before I approve a transaction			0.711	
I am required to approve transactions before they are completed.			0.694	
I am informed of service charges before transactions are made			0.692	
I get prompt information about the transactions I make.			0.615	
Mobile money charges are displayed at the agents' premises			0.592	
There are adequate safeguards to prevent manipulation by mobile money agents			0.535	
I am not required to purchase a new sim card to use mobile money services				0.784
I am not required to purchase a new phone to use mobile money services				0.756
I am not required to purchase a new phone to use mobile money apps.				0.654
Learning to use mobile money platforms does not cost me anything				0.62
I do not waste time or transport costs because there are mobile money agent outlets in my area				0.585
It doesn't cost me anything to register for mobile money services				0.561
Eigen value	9.737	4.051	2.145	1.752
Variance %	33.577	13.969	7.395	6.041
Cumulative variance %	**33.577**	**47.546**	**54.941**	**60.981**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Source: Primary data

Appendix 5: Table showing Factor Analysis for Financial Inclusion

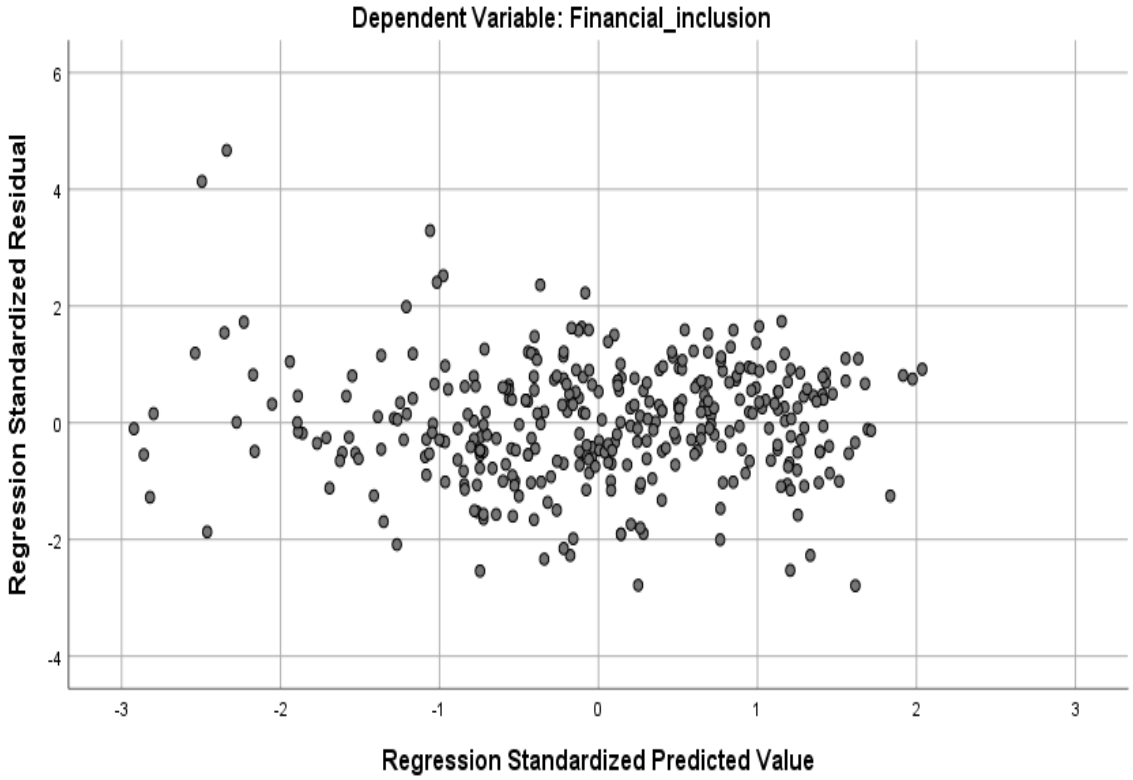
	Component		
	Quality	**Access**	**Usage**
Mobile money agents give prompt service	0.748		
I feel mobile money transactions are secure	0.729		
Mobile money networks are reliable	0.725		
Mobile money networks are fast	0.707		
Mobile money agents have operating hours convenient to all	0.702		

Mobile money service providers have strong and wide network coverage	0.700		
Mobile money network quality is always good	0.690		
Mobile money agents know the customer needs	0.680		
Helplines are easily accessible	0.678		
I feel safe doing business with mobile money agents	0.673		
I feel my privacy is not compromised when I transact with mobile money	0.669		
Mobile money service providers show sincere interest in solving customer problems	0.656		
Mobile money agents have up-to-date equipment	0.650		
Mobile money agents can be trusted	0.643		
Mobile money agents are available everywhere	0.642		
Mobile money agent premises are well organized	0.621		
I am issued with a receipt after mobile money transactions	0.582		
I get statements of my transactions on mobile money	0.537		
I get prompt feedback and notifications about my mobile money transactions	0.520		
I have a registered mobile money account		0.761	
I have a mobile phone which I use to access mobile money		0.724	
There is a usable access road to the nearest mobile money agent		0.694	
I live within 1km of a mobile money agent		0.689	
Mobile money agents are located in convenient places			
I regularly make payments using my mobile money			0.794
I regularly transfer funds from my bank account to my mobile money account			0.712
I regularly use my mobile money account to save			0.703
I regularly borrow using my mobile money			0.634
I regularly send money using my mobile money			0.622
I regularly received money using my mobile money			0.532
Eigen values	9.386	3.926	2.059
Variance %	30.278	12.663	6.641
Cumulative variance %	**30.278**	**42.941**	**49.582**

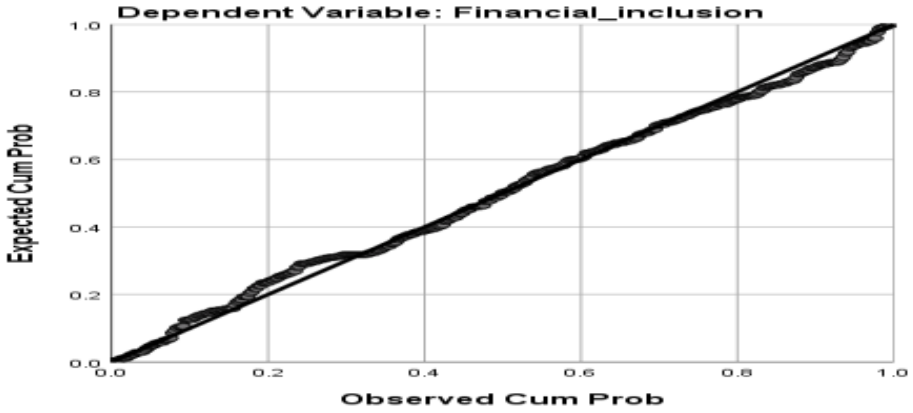
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Source: Primary data

Appendix 6. Scatter plot showing Regression Residual against regression standardized predicted value.



Appendix 7. Normal P-P plot of Regression standardized Residual graph



Appendix 8: Results of Barron and Kenny (1986) test for mediation

Model 1.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.728	0.157		4.651	0
	Digital financial services adoption	0.723	0.041	0.683	17.804	0

a. Dependent Variable: Financial inclusion

Model 2.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.36	0.175		2.059	0.04
	Digital financial services adoption	0.83	0.045	0.692	18.273	0

a. Dependent Variable: Transaction Costs

Model 3.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.637	0.151		4.212	0
	Digital financial services adoption	0.514	0.054	0.485	9.501	0
	Transaction Costs	0.252	0.045	0.286	5.597	0

a. Dependent Variable: Financial inclusion

Appendix 9: Letter of Introduction

MAKERERE UNIVERSITY BUSINESS SCHOOL
Plot 21A, Portbell Road, P. O. Box 1337, Kampala - Uganda
Phone: Direct Line: +256-414-222545; General Line: +256-414-338120; Fax: +256-414-505921
Faculty of Graduate Studies & Research

MASAKA DISTRICT LOCAL GOVERNMENT REC 27 NOV 2020 CENTRAL REGISTRY

November 25, 2020

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: ABOKE EMMANUEL EUGENE MBA 2017/HD10/79U

The above named is a student of Makerere University Business School pursuing studies leading to the award of Master of Business Administration of Makerere University. He joined the School in 2017 and is currently carrying out research on the topic: **"Digital Financial Services adoption, Transaction Costs and Financial Inclusion. A Case of Households in Masaka District"**

Any assistance rendered to him will be highly appreciated.

Thank you,

Nakiyingi Catherine
Faculty Admin.

Makerere University Business School * Faculty Of Graduate Studies And Research * 25 NOV 2020

MASAKA 17 DEC 2020 Received P. O. BOX 848, MASAKA

Email: deangrc@mubs.ac.ug @mubsfgsr Website: www.mubs.ac.ug