THE IMPACT OF FINANCIAL TECHNOLOGY (FINTECH) ON CONSUMER BEHAVIOUR, BANK PERFORMANCE AND REGULATORY RESPONSES: EVIDENCE FROM SUB-SAHARAN AFRICA COUNTRIES

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Abstract

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In Sub-Saharan Africa (SSA), Financial Technology, or FinTech, is significantly shaping the way consumers access financial services, and it is clear that FinTech will continue to revolutionize payment, savings, borrowing, and investment within the financial sector in the coming years. However, the evolution of FinTech services in SSA raises a number of critical issues: What are the key antecedents of FinTech adoption and how are consumers responding to the new FinTech ecosystem? What is the impact of FinTech activities on banks, and how are banks responding to the competition posed by FinTech start-ups? What has been the regulatory response to FinTech development in light of the possible threats to the financial system? Relying on the Unified Theory of Acceptance and Use of Technology (UTAUT) and Public Interest Theory of Regulation, this study addresses these questions. Data for the study was obtained by undertaking a cross-country electronic survey with participants from Ghana, Nigeria, Kenya, and South Africa. A total of 818 students and 132 bank officials with FinTech usage experience were recruited. The questionnaires were designed in Google Forms and administered to participants to elicit their responses. Qualitative data was also gathered using a semi-structured interview guide. Structural equation modelling (SEM) using PLS v 3.0 and logistic regression techniques were applied to analyze the quantitative data, while qualitative content analysis was undertaken to analyze the qualitative data. The empirical analysis revealed that consumers consider both risk and benefit factors when making FinTech adoption choices. We observe that whereas economic benefits, convenience, and perceived usefulness of FinTech services encourage consumer uptake, risk factors such as operational risk, legal risk, security risk, and privacy concerns impede FinTech adoption. It was, however, revealed that perceived benefit factors are prioritized by consumers over possible risk factors when considering FinTech adoption. The result further revealed that consumers who adopt FinTech platforms such as automated asset management (Robo-Advisors), equity crowdfunding, and peer-to-peer lending are more likely to save, invest, and borrow using these platforms. The study finds no evidence to suggest a significant influence of FinTech development on the performance of traditional banks. It was further found that whereas there has been increased FinTech activity within the financial space over the past decade, regulatory response to FinTech services within SSA has mainly focused on the use of existing financial legislation and policies instead of bespoke regulatory policies. The findings from the study have important implications for both research and practice. It may be of interest to FinTech regulators, traditional financial

institutions, FinTech firms, and academics focusing on FinTech research.

Declaration

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgment, the work presented is entirely my own

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Dedication

This work is dedicated to my wife and Parents

Acknowledgement

I thank the Almighty God for giving me the knowledge, insight, and strength to successfully complete this study. A special thank you to my family, wife, friends, and colleagues who in their unique ways have contributed to the success of this study. I should express my profound appreciation to research supervisor, Professor Adeoye Amuda Afolabi for his able guidance and support throughout the dissertation stage. Your able guidance and support are what has made this study possible. I will always remember and appreciate the insights and discipline you imparted to me during this journey. To Unicaf University, I say thank you for offering me scholarship to pursue my dream of obtaining a terminal degree in Accounting and Finance. To all participants who contributed to making this study possible, thank you for your help.

Table of Content

THE IMPACT OF FINANCIAL TECHNOLOGY (FINTECH) ON CONSUMER BEHAVIOUR, BANK PERFORMANCE AND REGULATORY RESPONSES: EVIDENCE FROM SUB-SAHARAN AFRICA COUNTRIES i
Approval of the Thesis ii
Abstract iii
Declaration v
Copyright Page vi
Dedication vii
Acknowledgement viii
List of Tables xv
List of Graphs/Figures xvii
CHAPTER ONE INTRODUCTION 1
1.1 Background of the Study 1
1.2 Statement of the Problem 12
1.3 Research Purpose 19
1.4 Objectives of the Study 21
1.5 Research Question 22
1.6 Hypotheses 23
1.7 Nature and Significance of the Study 23
1.8 Structure of the Study 27
1.9 Summary of Chapter 28
CHAPTER TWO LITERATURE REVIEW 29
2.1 Introduction 29
2.2.Theoretical Framework 31
2.2.1 The Actor-Network Theory 31
2.2.2 Technology Acceptance Model (TAM) 34
2.2.3 The Extended Post Acceptance Model (EPAM) 36
2.2.4 Innovation Diffusion Theory (IDT) 37
2.2.5 The Unified Theory of Acceptance and Use of Technology (UTAUT) 38
2.2.6 Consumer Theory and Disruptive Innovation Theory 39
2.2.7 The Theory of Financial Intermediation 40
2.2.8 The Public Interest Theory of Regulation 41

2.2.9 Outcome of Theoretical Review 43
2.3 Conceptual Framework 45
2.3.1 Financial Technology (FinTech) Ecosystem 45
2.3.2 Financial Technology (FinTech) 47
2.3.3 FinTech Business Models 53
2.3.4 FinTech Adoption 61
2.3.5 Drivers of FinTech Growth 65
2.3.6 Factors Influencing FinTech Adoption 68
2.3.7 FinTech and Individual Financial Behaviour 72
2.3.8 FinTech and Bank Performance 73
2.3.9 FinTech Regulation 78
2.3.9.1 Ways of regulating the FinTech Industry 80
2.3.9.2 Challenges of FinTech Regulation 82
2.3.9.3 Trends in FinTech Regulation 85
2.4 Empirical Literature Review 87
2.4.1 Empirical Studies on FinTech Adoption 87
2.4.2 Empirical Studies on Fintech Regulation 95
2.4.3 Empirical Literature on FinTech and Consumer Financial Behaviour 97
2.4.4 Empirical Studies on FinTech and Bank Performance 101
2.5. Gaps in the Literature 103
2.6 Summary of Literature Review 106
CHAPTER THREE METHODOLOGY 108
3.1 Introduction 108
3.2 Research Design and Approach 110
3.2.1 Philosophical Stance 110
3.2.2 Research Approach and Design 114
3.2.3 Research Settings 125
3.3 Population and Sample of the research study 126
Table 3.1 Sample Sizes for students and Bank officials 130
3.4.Materials/Instrumentation of Research Tools 130
3.4.1 Structure of the questionnaire 132
3.4.2 Structure of the Interview Guide 134
3.5 Operational Definition of Variables 134

3.5.1 Operational Definition of Study Variables for Research Question 1 135
Dependent Variable: 136
Independent (Predictor) Variables 137
Mediating Variables 139
Table 3.2: summary of study variables and sources from literature 140
3.5.2 Operational Definition of Study Variables for Research Question 2 141
Dependent Variables 141
3.5.3 Operational Definition Variables in Research objective 3 144
3.6 Study Procedures and Ethical Assurances 148
3.7 Piloting of the study 154
Table 3.6: Result of Pilot study Bank officials 156
3.7 Data Collection and Analyses 156
3.7.1 Structural Equation Modelling 157
..... 159
3.7.2 Logistic Regression 162
= ln □ □□□□ln □ □ 165
□ □ 165
□ □ 165
3.7.3 Content Analysis 167
3.8 Summary of Methodology 169
Figure 3.7 Study steps and procedure 171
CHAPTER FOUR DISCUSSION OF RESEARCH FINDINGS 172
4.1 Introduction to the Section 172
4.2 Trustworthiness of Data 171
4.3 Reliability and Validity of Data 174
4.3.1. Reliability of the Study 175
Source: Researcher's own construct, 2022 178
4.3.2 Validity of the Constructs 178
4.3.2.1 Discriminant Validity 180
Source: Researcher's own construct, 2022 181
Source: Researcher's own Construct, 2022 183
4.3.2.2 Convergent Validity 184
- PUS4 185

Source: Researcher's own construct, 2022 186
4.4 Results and Findings 188
4.4.1 Analysis of the factors influencing the adoption of FinTech in SSA 188
4.4.1.1 Demographics of Respondents 188
Source: Research Data 189
4.4.1.2 Respondents' Knowledge, understanding and Usage of FinTech Services 190
4.4.1.3 Level of awareness 192
4.4.1.3 Descriptive Statistics of Study Variable 196
4.4.1.4 Correlation of Study Variables 198
4.4.1.5 Preliminary Test of Assumptions 199
Multivariate Normality Test 199
Test of Multicolinearity 201
Factor Analysis 203
4.4.1.6 Estimation of the Structural Model: Testing of Hypotheses 205
** represents 1% significant level 206
** represents 1% significant level 206
Source: Researcher's construct, 2022 207
4.4.1.7 Individual Country Analysis 211
4.4.1.8 Model Fit Indices 213
4.4.2 Impact of FinTech adoption on borrowing, savings and investment 216
4.4.2.1 Assumptions of Logistic Regression 217
Source: Researcher's own Construct, 2022 218
4.4.2.2 Model Estimation 219
Hosmer-Lemeshow Tests 220
4.4.2.3 Contribution of the Predictor Variables to the Model 220
Source: Researcher's own construct, 2022 221
4.4.2.4 Predictive Power of the Model 224
4.4.2.5 Analysis of individual countries 225
4.4.3 The Effect of FinTech on Traditional Banks 227
4.4.3.1 Analysis of Demographic and General Characteristics of Bank Respondents 229
4.4.3.2 Views regarding the Popularity and Usage of FinTech Models 230
4.4.3.3 Growth in FinTech Innovations 231
4.4.3.4 Implications of FinTech activities on Traditional Banks 232

Table 4.26: “Descriptive analysis of the implication of FinTechs/MNOs on Banks” 233
4.4.3.5 Collaboration with FinTech Firms/MNOs 235
4.4.3.6 SEM Analysis of the effect of FinTech on Banks 235
4.4.3.7 Data Accuracy 236
Table 4.27: “Reliability and Validity of Constructs” 237
4.4.3.8 Estimation of Structural Model 237
4.4.3.9 Summary of Hypothesis 3 Testing 240
Result of Secondary data analysis 240
Table 30: Panel regression result with ROA as Dependent Variable 240
Table 31: Panel regression result with ROE as dependent variable 241
4.4.4 FinTech growth and regulatory Responses 241
4.3.1 Overview of FinTech Environment Nigeria 243
Ghana 245
Kenya 246
South Africa 247
Analysis of Major Regulators (Regulatory bodies) within the FinTech Ecosystem 248
Main FinTech Products in the Selected Countries 249
Regulation of the main FinTech platforms 250
Existence innovation offices 251
Availability of Regulatory Sandboxes 253
Availability and use of Regtech 254
Consumer Protection Initiatives 254
Table 4.34: Initiatives to improve trust in FinTech 255
Results of Qualitative Analysis (Interview) Overview 255
Factors influencing FinTech adoption 256
Question: What do you consider as the negative factors militating against FinTech adoption? 258
Question: What is the impact of FinTech on the performance of traditional banks? 260
What is the level of Collaboration between traditional Banks and FinTech services 261
Regulatory responses to the FinTech Ecosystem 263
Question: How has the regulatory authorities responded to the FinTech growth? 263
4.5 Evaluation of Findings 265
Perceived Usefulness (PUS) is positively related to FinTech adoption 266
Economic Benefit is positively associated with FinTech adoption 267

Perceived ease of use is positively associated with FinTech adoption....268
Convenience associated with FinTech services positively influence its adoption....268
Awareness/Knowledge of FinTech positively influences adoption 269
Financial Risk (FRK) is negatively associated with FinTech adoption....269
Security risk negatively influence FinTech adoption 270
Operational risk negatively influences the adoption of FinTech products 270
Legal risk negatively influences the adoption of FinTech products....271
Privacy Concerns negatively influence the adoption of FinTech products 271
Trust in FinTech services positively influence Adoption....271
Trust significantly mediates the relationship between risk-related factors and FinTech adoption 272
RQ2: What is the Effect of FinTech Adoption on Savings, Borrowing, and Investment?....273
RQ3: What is the impact of FinTech on Traditional Banks?....275
RQ4: Has FinTech Growth and adoption influenced regulatory responses in SSA? 278
4.6 Summary of the Section....279
CHAPTER FIVE....285
5.1 Introduction....285
5.2 Implications....288
RQ2: Does FinTech adoption Affect Savings, Borrowing and Investment of Consumers?....298
RQ3: Does the growth and development of FinTech affect the performance of banks 300
RQ4: What are the regulatory responses to FinTech Growth in SSA? 303
5.3 Recommendations For practice....306
For FinTech Firms /MNOs....306
i. For Traditional Banks....310
ii. For government and Regulators 311
5.4 Recommendation for Future Research 314
5.5 Conclusion 318
References....325
Appendix 1: Data Collection Tools....348
UNICAF UNIVERSITY, MALAWI....360
SECTION C: FINTECH AND THE BANKSING SECTOR....361
SECTION D: FINTECH REGULATION....361

List of Tables

Table 2.1 Definition of FinTech by Various authors 49
Table 3.1 Sample Sizes for students and Bank officials 130
Table 3.2 Summary of study variables and their sources from literature 140
Table 3.3 Study variables and their definition for research question 2 143
Table 3.4 Study variables and their measurement (research Question 3) 145
Table 3.5: Result of Pilot study for student Sample 155
Table *3.6:* Result of Pilot study (Bank officials) 156
Table 4.1 Cronbach Apha and Levels of Internal Consistency 176
Table 4.2 Test of reliability with Cronbach's Alpha 177
Table 4.3: Discriminant validity of Constructs (Correlation and Square root of AVE) 183
Table 4.4 Factor Loadings 181
Table 4.5 Demographic Characteristics of Student Respondents 188
Table 4.6 Descriptive Statistics of Knowledge of Various FinTech services 192
Table 4.7 Mean Ranking of FinTech platforms with respect to usage 195
Table 4.8 Descriptive statistics and correlation of study variables 197
Table 4.9 Correlation Results 199
Table 4.10 Results of the Tests of Normality of Data 201
Table 4:11: Test of Multicolinearity 203
Table 4.12. KMO and Bartlett's Test 204
Table 4.13. Measurement of reliabiltiy and validity of construct 205
Table 4.14 Result of Hypothesis Testing 206
Table 4.15 Indirect effect (mediation analysis) 206
Table 4.16 results of Path analysis across the foure countries 212
Table 4.17 Model Fit Indicators 215
Table 4.18 Multicolinearity Test 216
Table 4.19: Case Processing Summary 217
Table 4.20 Model Coefficients 219
Table 4.21; Hosmer-Lemeshow Test of Model Fitness 220
Table 4.22: Contribution of Predictor Variables to the Model 221
Table 4.23 Logistic regression results of individual countries 226
Table 4.24 Demographic Characteristics of Bank Respondents 230
Table 4.25: Perception of Bank Ofiicials rearding FinTech activities 232

Table 4.26 Descriptive analysis of thee implication of FinTech acitivies on Banks 233
Table 4.27: Reliability and Validity of Constructs 237
Table 4.28 Direct and indirect relationship between variables 239
Table 4.29 Summary of Hypotheses testing (research question 3) 239
Table 4.30: Panel regression result using ROA as dependent variable 240
Table 4.31: Panel regression result using ROE as dependent variable 241
Table 4.32: FinTech Regulators 249
Table 4.33: Main FinTech Products 249
Table 4.34: Initiatives to improve trust in FinTech 255
Table 4.35: Respondents views on the level of collaboration with FinTech firms .....……...262
Table 4.36 Respondents views on FinTech regulation ……..……. ..264

List of Graphs/Figures

Figure 2.1: Actor Network Theory 34
Figure 2.2: Concepts and their relationships 45
Figure 2.3: Elements of the FinTech Ecosystem 46
Figure 2.4 Diagramatic illustration of FinTech evolution and associated products/services 52
Figure 2.5 Tracking the History of FinTech Innovation 53
Figure 2.6: FinTech Business Models 54
Figure 2.7: Diagrammatic illustration of How a blockchain works 60
Figure 2.8: Level of awareness of various FinTech business models 62
Figure 2.9: Comparison of FinTech services and their percentage of adoption since 2015 63
Figure 2.10 Survey on reasons for FinTech adoption 64
Figure 3.1 Approach of mixed method design 122
Figure 3.2 Deductive research approach 123
Figure 3.3 Global FinTech ranking 126
Figure 3.4: Diagrammatic illustration of the relationship among the study variables 141
Figure 3.5 Steps in SEM Analysis 159
Figure 3.6 Diagrammatic Structural and measurement models of SEM 151
Figure 3.7 Study steps and procedure 168
Figure 4.1: Demonstration of Cronbach's Alpha values exceeding the recommended minimum 178
Figure 4.2: Latent variables and their measurements 180
Figure 4.3 Average Variance Extracted (AVE) for study constructs 181
Figure 4.4 Familiarity with FinTech 191
Figure 4.5: FinTech awareness level among key FinTech models 194
Figure 4.6 FinTech adoption rate (from 2015 to 2019 196
Figure 4.7: Path Diagram Illustration of SEM analysis 207
Figure 4.8: R-square and Adjusted R-square value 214
Figure 4.9:Mean ranking of various FinTech Platforms 231
Figure 4.10: View of respondent on threat posed by FinTech activities to banks 234
Figure 4.11: Respondents view on Disruptive nature of FinTech 234
Figure 4.12 Respondents views on the extent to which FinTech firms are collaborating with banks 235
Figure 4.13: Result of Structural model 238
Figure 4.14 Regulation of FinTech platforms in selected jurisdiction of SSA 250
Figure 4.15: Existence of Innovation offices 252

Figure 4.16 Countries with regulatory sandboxes 253

Table of abbreviations/acronyms

FinTech	Financial Technology
FSB	The Financial Stability Board
ICT	Information and communication technology (ICT)
ATM	Automated Teller Machines (ATMs)
P2P	Peer-to-Peer
MNOs	Mobile Network Operators
DFS	Digital Financial Services
IMF	International Monetary Fund
SSA	Sub-Saharan Africa
GSMA	Global system for mobile communication
EY	Ernst and Young
OECD	Organization for economic cooperation and development
PwC	PriceWaterhouse Coopers
BFA	Bali FinTech Agenda
TAM	Technology Acceptance Model
SEM	Structural Equation Modelling
UTAUT	Unified Theory on Acceptance and Use of Technology
SPSS	Statistical Package for the Social Sciences
ANT	actor network theory
EPAM	extended post-acceptance model
TRA	theory of reasoned action
IDT	innovation diffusion theory
IOSCO	International Organization of Securities Commissions
SWIFT	Society for Worldwide Interbank Financial Telecommunications
IAIS	The International Association of Insurance Supervisors
InSurTech	Insurance Technology
KPMG	Klynveld Peat Marwick Goerdeler
PU	Perceived usefulness
FCA	Financial Conduct Authority
ETAM	extended technology acceptance model
ROE	Return on Equity
ROA	Return on Assets
NIM	Net interest Margin
CSV	Comma-Separated Value
MPT	Mobile Payment and Transfer FinTech
ADP	FinTech Adoption
PUS	Perceived usefulness
EOU	Perceived ease of use
CVC	Convenience
ECB	Economic Benefit
FRK	Financial Risk
SRK	Security Risk

ORK	Operational Risk
LRK	Legal Risk
PVC	Privacy Concerns
AWN	Knowledge/Awareness
UREC	UNICAF Research and Ethics Committee
CFA	confirmatory factor analysis
EFA	Exploratory Factor analysis
QDA	qualitative data analysis
RegTech	Regulatory Technology
PRISMA)	Preferred Reporting Items for Systematic Reviews and Meta-analyses
AVE	Average Variance Extracted

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In recent years, technology has infiltrated and transformed almost every sector of our world, and the financial sector is no exception to this transformation. The financial industry has witnessed significant changes over the years, especially in the past decade. Digital evolution has transformed not only the way financial products are designed but also how they are delivered to consumers. Improvements in technological infrastructure, coupled with improved mobile applications and enhanced internet connectivity, are helping to create new applications across the financial sector. These include novel methods of lending, making payments, providing financial advice, pricing insurance, and more broadly, channeling financial resources from deficit units to surplus units (Frame, Hall, & White, 2018). Given the speed at which technology is advancing, it is not surprising that many economies and governments are placing significant emphasis on digitalizing their financial systems with the goal of advancing financial inclusion, promoting economic growth, and enhancing the user experience.

In the financial literature, the application of technology to facilitate payments, investment, savings, funding, borrowing, and other financial services is known as "Financial Technology" or “FinTech”. Put differently, FinTech can be described as “the marriage between finance and technology”. Although innovation and the application of technology to facilitate financial transactions has been part and parcel of the financial industry since the 1850s, FinTech has lately become a term to describe technological

breakthroughs within the financial sector which are spearheaded by special financial

services providers, with the potential to change how financial services are offered to consumers, support the creation of innovative financial models, and improve the efficient delivery of financial services to the benefit of consumers (Arner, et al. 2015). According to PwC (2017, p. 1), “FinTech is defined as the developing convergence of financial services and technology." It has also been described as “the marriage between finance and technology”. The Financial Stability Board (FSB) describes financial technology as "technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services" (Financial Stability Board, 2017). FinTech, therefore, connotes the application of technology to design and provide financial services to consumers rather than the use of traditional brick-and-mortar financial institutions and intermediaries.

Since its evolution, FinTech has changed and continues to transform the way financial services are designed and delivered. It continues to challenge the traditional roles played by banks, governments, and individuals in financial service delivery throughout the world. Needless to say, FinTech has affected and continues to affect almost all facets of our lives, including consumer attitudes, traditional financial institutions, and the regulatory environment. Technology has played an important role in the FinTech evolution, and this cannot be overemphasized. The emergence of smart phones and other important smart devices, coupled with the development of new applications and software systems, has been creatively applied to develop new financial products and services for consumers (Breidbach, Keating & Lim, 2020).

The application of technology in the financial arena is not a new phenomenon. According to Tharkor (2020), the use of technology in financial services can be traced back to the 18th century. Arner et al. (2016) corroborate Tharkor's assertion by arguing that finance and technology have co-evolved for decades. For instance, automated teller machines (ATMs) were first launched in the 1950s as a replacement for human tellers issuing cash and to enable consumers to access services personally without visiting the banking hall. Credit cards ultimately made it unnecessary to carry cash, and the advances in internet connectivity in the late 1990s paved the way for 24/7 online banking, making physical branch visits obsolete for many clients. Furthermore, technology-enabled risk management models, big data analytics, and electronic stock trading have been implemented over the years in the financial sector to enhance financial service efficiency (Mackenzie, 2015). However, the 2008 financial crisis, as well as heightened financial sector regulation enforced by various global financial agencies, cleared the way for new start-ups and providers within the financial arena to emerge (Anagnostopoulos, 2018). According to Muzellec et al. (2015), "the 2008 Global Financial Crisis eroded customer trust in financial institutions and spurred the emergence of FinTech companies." Since 2008, FinTech companies have grown significantly within the financial arena, delivering innovative financial services to customers in ways that traditional players within the financial space are not used to (Breidbach et al., 2020). These developments include the emergence of cryptocurrencies, digital wallets, crowdfunding, and peer-to-peer (P2P) lending platforms.

FinTech companies make use of new technology to perform tasks that were traditionally reserved for banks (Chen et al. 2019). Financial technology, or "FinTech," is

revolutionizing the global financial sector at a breakneck pace. It has redefined the way we undertake various financial transactions, such as borrowing, investing, transferring, spending, and even storing money over the past decade. It is estimated that more than $50 billion has been invested in nearly 2,500 FinTech-related firms around the globe (Skan et al. 2016). Investment in the FinTech sector has provided the needed resources for FinTech firms to introduce more innovative financial products within the financial sector. This data shows that the industry is well-known in the financial world and hence provides fertile ground for more innovative ideas and research. There is little doubt that developments in information technology have fueled development and innovation in the FinTech space during the last two decades. The technological underpinning for many of the FinTech business models is the development of key information technologies. Cloud computing, machine learning, big data, cryptographic algorithms, and mobile internet access are examples of these technologies. Put together, these innovations or technologies have made it possible to collect and analyze large volumes of data, design more secure systems, and link economic agents in real time across a variety of platforms. These technologies have not only made it easier to provide financial services, but they have also helped create new business models and opportunities in the financial field (Gomber, Kock, and Siering, 2017).

According to Makina (2019), FinTech is changing the financial landscape in three significant ways. First, digitalization is being applied in financial services to promote efficiency in financial service delivery. Second, financial technology is making it possible for consumers to access cheap and accessible financial services. Third, FinTech is making it possible and easier for individuals who are financially excluded to be part of the wider

financial system. Individuals and businesses are now using new technologies such as online banking, smartphone payments (mobile money), and online trading to facilitate their financial transactions. The use of technology to support financial service delivery has, therefore, become an important business model as far as the modern financial sector is concerned (Makina, 2019). Makina's (2019) observation is also supported by Ryan's (2019) claim that FinTech has lowered transaction costs, increased the number of financial products and services available to consumers, and given consumers who couldn't get access to financial services before the chance to do so.

Financial technology has brought significant changes to businesses and individuals. It has introduced innovations that have transformed the way lending, investment, payments, and savings are done. Traditionally, banks have been at the forefront of granting loans to individuals and businesses. However, the difficulties associated with assessing loan facilities through the bureaucratic banking system have been reduced through FinTech. A lending model such as peer-to-peer (P2P) has transformed the lending landscape and has made it cheaper and easier for individuals and businesses to access funds for their personal and business needs. With regards to payment systems, technologies such as peer-to-peer online payments, mobile wallets, cryptocurrency, and Blockchain have significantly transformed the way transactions are paid for or settled. Financial technologies and innovations have not only transformed the lending and payment landscape but have also brought significant innovations in the area of savings and investment. Online peer-to-peer models such as crowdfunding and new budgeting apps have also been introduced. Thus, the key areas of finance, which include financing, investment, payments, and savings, have been significantly transformed by technology.

Although conventional financial institutions have traditionally embraced technology within the financial space, the recent FinTech "revolution" has been propelled by developments in digitalization and information technology. The presence of new market entrants mobile network operators, technology businesses, and startups have also boosted the FinTech ecosystem (AFI, 2018, 2020; Arner, Barberis, & Buckley, 2015). These companies provide a variety of financial services using the internet and smart devices to offer payment services, online trading, mobile money services, and other digital payment platforms. These digital financial services (DFS) provide global citizens—notably the poor—with faster, cheaper, and more efficient platforms to conduct their daily transactions, save against emergencies, and invest in the health and education of their families. From this standpoint, FinTech promises increased financial inclusion, which helps individuals build financial resilience and achieve long-term financial stability (Demirgüç-Kunt, et al. 2018; Liu et al. 2020). The benefits associated with FinTech innovation cannot be overemphasized. In the past decade, individuals, businesses, and the government have shown a significant preference for FinTech and other electronic payment platforms due to their convenience, efficiency, speed, cost, 24/7 availability, and rigorous security measures (Stewart and Jurgens, 2018). Apart from changing consumer tastes and preferences, digital technologies have demonstrated their capacity to address lingering financial exclusion challenges, as evidenced by the phenomenal success of mobile money in developing economies.

In Sub-Saharan Africa, FinTech has become a major force that is shaping the structure of the financial sector. The region, in the past decade, has witnessed the development and adoption of new technologies with the potential to alter the competitive

landscape in the financial sector. By opening up the financial services business model, FinTech continues to challenge the traditional structures and offers efficiency benefits. FinTech is now establishing itself as a technology enabler in the region, promoting financial inclusion and functioning as a catalyst for innovation in other sectors such as agriculture, industry, and services (IMF, 2019). Within the SSA region, FinTech continues to significantly improve financial inclusion and deepening by increasing the financial sector's efficiency.

As has been recently documented by the World Bank and the International Monetary Fund (IMF), the region with the highest adoption of Mobile Money FinTech technology has been Sub-Saharan Africa. Adults have mobile money accounts at a higher rate than traditional bank accounts, with a 12% adoption rate compared to 2% globally (World Bank, 2015). Aside from mobile payment and transfer FinTech, it is further estimated that there are over 260 FinTech companies offering a variety of FinTech products and services in SSA (EY, 2019). The services offered by these FinTech firms are significantly transforming the lives of many Africans on a daily basis. In a study conducted by researchers at the Massachusetts Institute of Technology (MIT) in 2016, it was observed that financial technology has significantly enhanced financial inclusion in Kenya and has helped about 200,000 Kenyans come out of extreme poverty. Also, the study observed that financial technology has empowered over 190,000 Kenyan women to start their own businesses instead of engaging in peasant farming.

Mobile money FinTech is arguably the most significant innovation within Africa's financial sector. The mobile money platform is not only transforming the financial sector of SSA but also having a positive impact on other sectors of the economy, such as

education, agriculture, energy, water and sanitation. In most SSA countries, mobile money is used to pay school fees, farmers' bills, energy bills, and other utility bills (Makina, 2019). With regards to the SSA economy, mobile money is having a significant impact. In 2016, the mobile money industry contributed about 7.7% of GDP in SSA, and this is expected to increase to 8.6% at the end of 2022. The direct employment of mobile money in 2016 was estimated at $1.1 million, which is expected to increase to $1.3 million in 2020 (GSMA, 2017). Aside from the massive interest in digital payments, crowdfunding in FinTech is another business model that is having a considerable impact on small businesses in SSA. Even though crowdfunding in the sub-region is not as pronounced as digital payment platforms, available evidence suggests the online micro-credit market in countries such as South Africa, Nigeria, and Kenya is very vibrant. The online micro-credit platform is supporting small businesses by raising money to support their operations. It is also estimated by Afrikstart (2016) that $32.3 million was raised through crowdfunding in Africa in 2015 alone. The crowdfunding FinTech platform promises to improve considerably in the coming years. Other FinTech platforms such as digital currency and equity-based crowdfunding are also gaining appreciable momentum in SSA Makina (2019).

While the potential benefits of FinTech are widely acknowledged, there are concerns about the risks and vulnerabilities that these technologies and platforms may entail. New FinTech firms with no prior expertise in the financial industry are offering innovative financial services. Blockchain-based solutions, for example, have the potential to enhance the trust consumers have in FinTech services as their applications are designed to provide a secure digital infrastructure for authenticating, identifying, and making faster

and cheaper cross-border payments, as well as preserve property rights (Pisa and Juden, 2017). On the other hand, these technologies may be rapidly generating new types of risks that aren't completely recognized or safeguarded by the current legal framework.

Despite the increasing importance and acceptability of the FinTech phenomenon within the African continent, academic insight into the subject has been scarce and most publications on FinTech have been done through commercial reports (Zavolokina et al., 2016). Questions about the factors affecting consumer adoption of FinTech, the impact of FinTech services on the existing financial system and consumers, and the nature of FinTech regulation within SSA are still begging for answers (Makina, 2019; Didenko, 2018). In a recent study conducted by Kavuri and Milne (2019) to explore gaps in the FinTech literature, the authors observed that there is a lack of research addressing the relationship between data security and the attitude of consumers towards FinTech services. They further highlighted the need to investigate customer attitude and behavioural factors that may have a significant influence on the adoption of FinTech services in developing countries.

Also, since FinTech firms are providing financial services similar to the ones offered by traditional institutions, questions are being asked about the possible impact of FinTech on these traditional financial institutions. Whereas conventional financial institutions have traditionally embraced technology, they have been slow in doing so compared to new FinTech start-ups. Evidence from studies such as EY (2019) and Li et al. (2017) suggests that FinTech firms are taking over some financial services hitherto provided by banks and traditional financial institutions. In SSA, the story is not different as the number of mobile money accounts exceeds bank accounts (GSMA, 2016). The

extent to which FinTech is disrupting traditional banking systems and influencing their performance in the African sub-region necessitates empirical research.

The FinTech sector can thrive and enhance financial inclusion if there is a proper regulatory regime. The disruptive nature of FinTech services coupled with their inherent risks requires a special regulation to ensure that consumers and the financial system are protected (Kavuri and Milne, 2019; Financial Stability Board, 2017). In the United Kingdom (UK) and other developed economies, a special regulatory regime, popularly referred to as "regulatory sandboxes," has been developed in response to the growing FinTech environment. The focus of the special regulation regime is to encourage FinTech activities while at the same time ensuring the protection of consumers and the financial system. Given that FinTech is making inroads into the financial sector of SSA, it is important to look at how African countries are responding to the growth of FinTech through policies and regulations, and how well these policies and regulations strike a balance between encouraging FinTech innovation and protecting consumers in the financial sector.

There is no doubt that FinTech is gradually revolutionizing the financial system in SSA. The changes in the financial sector raise a number of critical issues. What are the key determinants of FinTech adoption and how are consumers responding to the new financial ecosystem? What has been the impact of the FinTech evolution on banks, and how are they responding to the competition? What has been the regulatory response to FinTech development in the sub-region? Providing answers to these questions will support the development of the financial system and also enhance policy formulation in the ever-changing financial sector in SSA.

To accomplish the study's objectives, we employ the most well-tested and well-established technology adoption theories. This study provides a framework in which risk-benefit factors are combined to determine their influence on FinTech adoption. In addition, various mediating variables important to FinTech adoption were included in this study. Because of the disruptive nature of FinTech innovation and its potential influence on the financial sector, we also assess the influence of FinTech growth on bank performance by employing non-financial performance measures and other well-known constructs.

Because there are few empirical studies that explain FinTech adoption and the influence of FinTech on consumer behaviour, existing institutions, and regulatory responses, the current study will add to the literature and knowledge on FinTech by:

1) analyzing the antecedents of FinTech adoption using a risk-benefit framework which is expected to shed more light on the drivers and inhibitors of FinTech adoption in SSA.
2) contributing to existing knowledge about the role of FinTech in influencing consumer savings, investment, and borrowing behaviour, as well as making recommendations on how it can be improved to promote financial inclusion.
3) highlighting the impact of FinTech on existing financial institutions and determining the extent to which FinTech growth affects the performance of existing players in the financial sector.
4) contributing to our understanding of FinTech regulation within SSA and how the regulatory regime strikes a good balance between enhancing FinTech innovation and financial inclusion on the one hand and safeguarding consumers and the stability of the financial system on the other.

5) combining important technological and behavioural factors and analyzing the mediating effect of trust, the study adds to the literature on FinTech adoption and technology acceptance models. The study is also expected to aid the understanding of user beliefs and perceptions regarding FinTech adoption.

1.2 Statement of the Problem

The problem is that, despite the significant interest shown in FinTech in SSA, the adoption of FinTech technologies leaves much to be desired. Again, the influence of FinTech on consumer behaviour, the banking sector, and the regulatory responses has not been extensively examined in the extant literature in SSA.

In Sub-Saharan Africa, financial technology has been receiving significant acceptance over the years. FinTech services including crowdfunding, peer-to-peer lending, robo-advisor services, automated insurance services, and crypto-assets are gradually receiving some attention in the region. Arguably, the most successful FinTech business model is the mobile payment and transfer FinTech platform, which enhances the payment for products and services using mobile technology (Makina, 2019). Sadly, despite the potential benefits of this payment innovation, it is estimated that only 17% of rural folks within SSA are captured on the mobile money platform (GSMA, 2016). Also, a significant number of urban dwellers and students are still skeptical about its adoption (Kavuri and Milne, 2018). Also, other FinTech models like crowdfunding, online lending, asset management (Robo Advisors), and cryptocurrencies have not yet become widely accepted and used in SSA (Yermack, 2018; Kavuri and Milne, 2018). While FinTech has received a lot of attention, it's still unclear whether it will continue to receive continuous acceptance.

Considering FinTech has significant risks, some users are hesitant to continue using it. The low level of adoption of these FinTech services not only stifles the financial inclusion drive of African governments but also robs consumers of the opportunity to take advantage of the convenience, cost-saving, and economic benefits associated with FinTech services. To develop policies to improve FinTech innovation and adoption in SSA, it is crucial to examine the factors that promote or inhibit the adoption of these FinTech services. Whereas some empirical studies such as Stewart & Jurjens (2019), Laurn & Lin (2005), and Rhu (2018) have identified trust, data security, and design interface, among others, as some of the factors affecting the adoption of FinTech products, these studies have mainly focused on developed economies. In countries like Sub-Saharan Africa, the factors that affect FinTech adoption haven't been thoroughly studied (OECD, 2018; Kavuri and Milne, 2018). This calls for more empirical studies to figure out which factors inhibit or promote FinTech adoption in these countries. Also, the few studies that have examined FinTech adoption in SSA have mainly focused on the perceived benefits and ease of use factors, neglecting security and risk factors. Again, such studies have primarily focused on single-country analysis, limiting the generalizability of their findings. This study aims, inter alia, to bridge these research gaps and provide a framework for understanding the drivers and inhibitors of FinTech service adoption in SSA. Financial technology services have recently attracted massive attention from industry players and academia alike. Although many experts and practitioners believe that FinTech promises to transform the future of the financial services industry, others are suspicious of its adoption due to the significant risks it entails. As a result, there is a need to appreciate why people are ready or uncertain to adopt FinTech, as well as the positive and negative variables that influence their decision. According to Chan

(2015), FinTech firms face a challenge in maximizing the possible benefits of FinTech while minimizing the threats. In view of this, it's critical to identify the elements that influence why individuals continue to use FinTech. The current study, among other things, proposes a risk-benefit framework that incorporates both positive and negative variables related to FinTech adoption.

Many people in developing nations rely on risky, unusual, and unreliable informal savings strategies to secure their investments due to their inability to access formal financial services (Adan, 2016; Batista & Vicente, 2017). Other techniques of saving, such as saving "under a mattress," subject savings to theft or fire and one may be encouraged to spend the money on unwanted items (Ky et al. 2017). According to existing research, financial inclusion in developing countries is extremely low, with women accounting for the majority of people with limited access to financial services (Demirgüç-Kunt & Klapper, 2013; Mas & Mayer, 2011). Mobile phone applications that allow people to save money are regarded as secure since they allow consumers to get their money promptly while avoiding some of the risks associated with utilizing the untrustworthy and risky informal savings technique (Prina, 2015). There's a lot of evidence that having access to mobile money helps households save more money, spend more, utilize their bank accounts more, and change their careers (FSD Kenya, 2015; Suri, 2017; Suri & Jack, 2016). Despite the fact that substantial study has been done on the socioeconomic impact of mobile FinTech in the areas of transfers, risk sharing, and consumption, empirical evidence on its ability to influence savings, borrowing, and investment remains limited.

The growth of the FinTech sector in the past few years has not only piqued the interest of researchers in the area of consumer adoption but has also provided an opportunity to investigate how FinTech innovation and its adoption are shaping the financial behaviour of consumers in areas such as savings, consumption, and investment. However, studies investigating the impact of FinTech adoption on consumers' financial behaviour are woefully inadequate (Lee and Shin, 2018). Whereas we acknowledge the contributions of Ozili (2017) and Navaretti, Calzolari, & Pozzolo (2017) in explaining the impact of FinTech on consumer choices such as savings, consumption, and borrowing, these studies have mainly offered theoretical explanations without any empirical investigations into the impact of FinTech adoption on savings and investment patterns of households in SSA. Failure to comprehensively assess the impact of FinTech on consumers will not only deprive FinTech firms of the needed information required to ascertain the impact of their products and services on consumers, but will also deny the government the necessary information needed to develop policies to encourage financial inclusion, savings, and investment within SSA. Given that consumers in SSA are becoming more interested in FinTech services, it will be interesting to find out how the use of FinTech has changed the way consumers save and invest.

In view of the evolution of FinTech, new companies such as FinTech start-ups, BigTech, and MNOs have entered the financial industry. FinTech startups are active in areas such as mobile payments, remittances, lending, crowdfunding, trading and capital markets, insurance, personal financial management, and wealth management. While the global penetration of FinTech adoption is still in its early stages, there is potential competition between FinTech firms and traditional financial institutions, which might

result in a reduction in market share and profitability of the latter (Thakor & Boot, 2019). According to Thakor and Boot (2019), FinTech firms pose a substantial threat to the banking industry and may eventually replace traditional financial institutions. FinTech Firms are now competing fiercely with traditional banks to provide financial services to customers. This competition could undoubtedly have some impact on the financial performance of traditional financial services. Phan et al. (2019) and Li et al. (2017) have also observed that some activities of banks are now being ceded to FinTech firms, and some FinTech services are now being adopted by consumers as substitutes for traditional banking services. Also, a report published by PwC shows that an increasing number of consumers are using non-traditional financial services (PwC, 2017). Furthermore, EY (2019) has revealed that mobile money in SSA is gradually surpassing traditional banking. These findings, among others, suggest that the growth of the FinTech sector could affect the profitability and sustainability of traditional financial institutions, especially banks. However, the degree to which the development of the FinTech business in SSA is affecting the performance of traditional banks requires empirical analysis to unravel.

Despite the possible negative impact of FinTech services on banks, other researchers have argued that FinTech firms have become a challenge, which could be translated into an opportunity as they can inspire banks to improve their functionalities, flexibility, and customer experience (Elsaid, 2021). For instance, Purnomo and Khalda (2019), Temelkov (2018), Navaretti, Calzolari, and Pozzolo (2017) have argued that there is a strong collaboration between FinTech firms and traditional banks, and as a result, banks are not feeling the impact of FinTech innovation on their activities. Given the preceding arguments, the development of FinTech firms and their influence on regulated banking

activities appears to be an important topic to investigate. Digital innovation has flourished in the last decade, particularly in financial technologies (FinTech). However, traditional actors in the financial industry (financial institutions) have just recently begun to participate in new technological advancements (Brandl and Hornuf, 2017).

Notwithstanding the rise of FinTech innovation and its projected impact on the financial industry, little is known about the impact of digital FinTech growth on traditional financial institutions. Even though studies such as cumming and Schwienbacher (2016), Li et al. (2017), Haddad and Hornuf (2018), and Brandl and Hornuf (2017) have investigated the influence of FinTech and digital innovation on traditional financial institutions, these studies have mainly been conducted in developed economies, leaving a gap to be filled as far as developing economies are concerned. Addressing the extent to which FinTech innovation is affecting traditional financial institutions will provide some insight into the influence of FinTech on traditional banks in Africa and how banks can position themselves to compete and collaborate effectively to ensure their sustainability. Although some work has been done to explore the impact of FinTech on the financial arena (see Phan et al., 2019; Hadad and Hornuf, 2018; Cumming and Schwienbacher, 2016), these studies have mainly focused on banks in developed markets, and therefore, there is a need to empirically assess the effect of FinTech on traditional financial institutions within the African context.

The disruptive nature of FinTech services coupled with their inherent risks requires a special regulatory response to ensure that consumers and the financial system are protected (Kavuri and Milne, 2019; Financial Stability Board, 2017). However, for FinTech regulation to achieve the desired impact, it must strike a good balance between

encouraging innovative financial services on the one hand and protecting consumers and the financial system on the other. Failure to properly regulate the FinTech sector could compromise the data and security of consumers and affect the general financial system. The importance of proper and balanced regulation within the FinTech sector has been re-emphasized by the Bali FinTech Agenda (BFA), which proposes, among others, that countries and regional blocks must "adopt regulatory frameworks and supervisory practices for orderly development and stability of the financial system" (IMF Policy Paper, 2018, p. 7). In the United Kingdom (UK) and other developed countries, a special regulatory regime, popularly referred to as "regulatory sandboxes," has been developed to encourage FinTech activities while at the same time ensuring the protection of consumers and the financial system. In SSA, however, questions about the extent to which regulators and governments are responding to the growth in the FinTech sector have been raised. Also, questions about the nature of FinTech regulation and the extent to which it strikes a balance between the promotion of innovation and the protection of consumers and the financial system have not been adequately answered (Kavuri and Milne, 2018). Answers to these questions will not only highlight the level of regulatory preparedness of SSA countries towards FinTech innovation but will also give some insight into how well FinTech consumers and the financial system are protected against some of the possible negative effects of FinTech adoption. Understanding the regulatory responses of SSA governments will also go a long way to influencing consumer confidence regarding the efficiency, safety, and security of FinTech services. Makina (2018) and Didenko (2019) have tried to look into how FinTech is regulated in Africa. However, these studies do not

provide a full picture of the risk that FinTech poses to the financial stability of developing countries and the policy and regulatory responses that are needed.

It is not out of place to argue that FinTech research is still in its infant stage. As a new phenomenon, there is still a paucity of studies on the subject (Lee and Shin, 2018). A cursory analysis of the FinTech literature revealed that studies have mainly been theoretical rather than empirical (Walker, 2017; Puschmann, 2016; Kalmykova et al., 2015; Navaretti, Calzolari, and Pozzolo, 2017). These studies have focused primarily on the definition and scope of the FinTech phenomenon; the various business models of FinTech; and the need for regulation to minimize its potential risks. A cursory examination of the financial literature shows that more needs to be done to explore the impact of financial technology on consumers, financial institutions, and the regulatory environment (Schueffel, 2016). This research seeks to bridge the literature gap and offer empirical insight into the impact of FinTech on the financial ecosystem

1.3 Research Purpose

In response to the low FinTech adoption rate in SSA and the lack of clarity regarding the influence of FinTech on consumers, banks, and regulatory responses, the focus of mixed-method research is to assess the drivers and inhibitors of FinTech adoption and how FinTech adoption influences consumer behaviour, traditional banks, and regulatory responses. The study explores what influences FinTech adoption and the extent to which adoption influences savings, investment, and borrowing. It also assesses the influence of FinTech growth on traditional financial institutions. Finally, it examines the regulatory responses to FinTech innovation. The study relied on the Technology

Acceptance Model (TAM), Financial Intermediation Theory, Disruptive Innovation Theory, and other related theories to investigate the FinTech phenomenon. A cross-country electronic survey, using Google forms was undertaken with participants from Ghana, Nigeria, Kenya, and South Africa. These countries were selected because they are the major FinTech hubs in SSA. Two sets of populations were used: the student population and bank officials from the selected countries. The participants include students from selected universities and bank officials from selected banks who have FinTech usage experience. Purposive and snowball sampling techniques were employed to recruit student participants from the Ghana Communication Technology University (GCTU), University of Ghana, University of South Africa (UNISA), Kenyatta University, and Babcock University. These institutions were chosen based on the availability of their students to participate in the study. The survey was created with Google Forms and sent out to participants via email and WhatsApp, a popular social media application. The participants received the link to the Google Forms questionnaire via email and WhatsApp. According to Topolovec-Vranic and Natarajan (2016), "social media platforms such as Facebook, WhatsApp, LinkedIn, and Instagram provide new ways to recruit people for research involving participants across different geographical locations." For instance, using social media channels to attract potential study participants has some advantages, including worldwide access, a snowball effect, and quick dissemination (McRobert et al. 218). The Google Forms were configured to ensure that one response per device is required to prevent the potential for repeated responses from the same participant. Because there was no motivation for potential participants to submit multiple responses using multiple devices, there was little incentive for them to do so. The banks from which officials were recruited

include Absa bank (Ghana, South Africa), Ghana Commercial Bank (Ghana), Guaranteed Trust Bank (Nigeria), and Standard Chartered Bank (Kenya). These banks were chosen based on the availability and willingness of their officials to participate in the study. In addition to the structured questionnaires, an interview was conducted with selected bank officials from Ghana to gain more insight into the phenomenon under investigation. Furthermore, to gain insight into the regulatory frameworks for managing FinTech innovation, existing documents and records on FinTech activities within the selected countries were sampled and analyzed. Structural equation modeling, logistic regression, descriptive statistical tools, and thematic content analysis techniques were employed to analyze the responses from the various data collection instruments.

1.4 Objectives of the Study

In order to contribute to addressing the gaps identified in the literature, the study's main goal is to investigate FinTech adoption in SSA and to ascertain the effect of FinTech adoption on consumer behaviour, traditional financial institutions, and regulatory responses. From this broad objective, the following specific objectives are pursued:

1. To assess the factors influencing consumer adoption of FinTech services in Sub-Saharan Africa.

2. To investigate the extent to which FinTech adoption affects the savings, borrowing, and investment behaviour of households in SSA.

3. To examine the influence of FinTech growth and adoption on the performance of banks in Sub-Saharan Africa.

4. To explore the regulatory measures and policy responses by Sub-Saharan African governments to the growing FinTech environment.

1.5 Research Question

Research questions are motivated by the apparent knowledge gap in a field of research (Hulley et al., 2007). The knowledge gap that prompted this research is that there is still uncertainties regarding what drives FinTech adoption; and there is lack of clarity regarding the influence of FinTech on banks, customer behaviour, and regulatory responses. A number of issues have compelled the questions raised in this research. First, there is no doubt that despite the benefits associated with FinTech, some consumers are hesitant to adopt and use such services. The non-adoption of FinTech initiative is an issue that cannot be glossed over. Second, it is one thing understanding the antecedents of FinTech and another appreciating the influence of FinTech in supporting the financial inclusion agenda. The influence of FinTech adoption in supporting savings, investment, and borrowing are issues worth addressing. Furthermore, given the important role of banks in the financial ecosystem, understanding the threats and opportunities that FinTech brings to banks, as well as their impact on financial institutions' primary activities, and their role in modern financial ecosystems, is crucial. It's especially unclear if the FinTech evolution will utterly end traditional banking or, on the contrary, reinforce it. The study design is then structured to address these research questions, which contributes to bridging the gaps identified. The research questions are designed to fit the mixed method research design. The main research questions are as follows:

Q1. What variables promotes or inhibits consumer adoption of FinTech services in Sub-Saharan Africa?

Q2. Does the adoption of FinTech services affect the savings, investment and borrowing behaviour of households in Sub-Saharan Africa?

Q3. To what extent does the growth in FinTech firms affect the performance of banks in Sub-Saharan Africa?

Q4. What are the regulatory measures and policy responses by Sub-Saharan African governments to the growing FinTech ecosystem?

1.6 Hypotheses

Based on the research questions, thee following hypotheses are examined

H1a: Benefit factors associated with FinTech usage have significant positive effect on adoption

H1b: Risk related factors negatively impact FinTech adoption

H2: FinTech adoption has significant influence on consumer behaviour in terms of savings, borrowing, and investment

H3: The development of FinTech has significant impact on existing financial institutions (banks)

H4: FinTech has influence on the regulatory environment of SSA countries

1.7 Nature and Significance of the Study

The focus of this research is to investigate consumer adoption of FinTech services in SSA and its implications for consumer financial behaviour, banking performance, and regulatory responses. To achieve the objectives of this study, primary and secondary data was gathered and analyzed. Quantitative and qualitative analysis techniques were applied to analyze the data using data analysis techniques such as structural equation modelling (SEM), logistic regression, and descriptive statistics. The essence of this research, like all other studies, is to make original contributions to the existing body of knowledge and shape policy direction. This research contributes to academic research, policymaking, and the promotion of financial inclusion in the following ways:

First, whereas the researcher acknowledges that some aspects of FinTech have been empirically and theoretically investigated from the perspective of SSA, it is the considered view of the researcher that no comprehensive work has been done to link FinTech with consumer behaviour and bank performance. What makes this study unique and different from other studies is the depth of coverage and its ability to link various components within the FinTech ecosystem. Linking FinTech to consumer financial behaviour, traditional financial institutions' performance, and the regulatory environment may be helpful for FinTech firms and policy makers to appreciate the influence of FinTech on individuals, businesses, and the economy as a whole.

Second, a cursory assessment of the existing studies shows that the majority of the research on FinTech have been theoretical rather than empirical. Also, few of the empirical studies have applied quantitative techniques to investigate the effect of FinTech within the African context. Whereas the qualitative method and techniques offer a great opportunity to understand the subject matter of FinTech in detail, findings from such studies cannot be easily generalized to cover a wide range of people. This study applies robust econometric techniques such as SEM and logistic regression. The use of a robust econometric model in this study contributes to the understanding of FinTech from an econometric or quantitative perspective and helps to bridge the methodological gap in FinTech studies.

Third, this study helps in shaping policy direction as far as FinTech firms are concerned. For instance, the study examines the promoters and inhibitors of FinTech adoption in SSA, and the findings support the design and delivery of FinTech services by these firms. The study also highlights the important areas of FinTech innovations in SSA

that need to be improved by FinTech firms and regulators to promote adoption intentions. Also, this study gives some insight into the impact of FinTech on consumer financial behaviour, such as savings, borrowing, and investment. As a result, the findings are an important guide for the government as it makes policies to improve financial inclusion.

Furthermore, the importance and significance of this study are further boosted by the increasing interest in FinTech worldwide. FinTech is becoming an important policy priority area because it has the potential to enhance the cash-lite and financial inclusion agendas of governments on both the national and global fronts. This is evidenced by the massive investment in the FinTech sector. It is estimated that investment in the sector jumped from $4.05 billion in 2013 to a little over $15.6 billion in 2017 (PwC, 2017). The increasing investment in the sector shows that the sector is experiencing significant growth and is poised to even grow further in the coming years. As financial technology becomes more popular and a top national priority, issues like how it is used, how it affects consumers and the banking industry, and how it affects the regulatory environment become important. This study looks at these issues.

The UTAUT model, which has become the most comprehensive solution for forecasting human behaviour, particularly in terms of technological innovation adoption (Vinnik, 2017), ignores privacy issues and risk. Again, it does not separate risk into operational, security, legal, and financial categories. This research contributes to the extant literature by incorporating these variables to determine how they influence FinTech adoption in SSA. In addition, existing variables that have been used in previous studies, such as perceived usefulness, convenience, and ease of use, are included in the model and

re-validated to determine how they influence the adoption of FinTech in the ever-changing technological environment.

Furthermore, it is noteworthy that the regulation of FinTech business models has become one of the most essential topical issues in FinTech research (Kavuri and Milne, 2019). The nature of FinTech services requires a special regulatory response be initiated to take care of innovative but risky financial products. As far as the researcher is concerned, no empirical study has been done to explore how SSA governments are responding to FinTech innovation. This further emphasizes the uniqueness of this study in expanding the frontier of knowledge in the area of FinTech, especially in SSA. The study also significantly contributes to the understanding of how regulators and governments within SSA are responding to the threats and opportunities associated with FinTech innovation.

Even though FinTech is a new phenomenon and that the subject is still at its infant stage, a number of publications and research articles on the subject have been conducted. Unfortunately, few studies have been conducted in SSA, even though this region has significantly embraced FinTech innovations (Makina, 2018). There is, therefore, a gap in the research as far as understanding the African context is concerned. From bibliometric research conducted by Li and Xu (2021), it was observed that SSA does not feature in terms of publications in FinTech. The current study, therefore, contributes to bridging the research gap by focusing on SSA, which has become a major player within the FinTech ecosystem.

1.8 Structure of the Study

The current research is broadly organized around five key chapters. Chapter one is designed to introduce the topic and the problem of the study. Based on the introduction of the topic, the problem was identified and clarified. The research problem formed the basis of developing the research questions and objectives. Chapter one also focused on the purpose and significance of the current study in addressing the existing gap.

In chapter two, a comprehensive literature review is conducted to gain a broader understanding of what has been done in the topic area. The literature review focuses on theoretical, conceptual, and empirical reviews. Existing theoretical frameworks in the area of FinTech adoption, the influence of technology on existing systems, and regulatory frameworks were examined. The conceptual literature review focuses on the key concepts of the topic. The chapter also presents an extensive empirical literature review by focusing on what has been done in the topic area. Research in this area was reviewed across developed, developing, emerging, and SSA countries.

In chapter three, the research methodology and data collection processes are outlined. The philosophical underpinnings of the study, the research design, population and sampling techniques, sources of data, operationalization of the study variables, as well as data analysis techniques are discussed in this chapter. Lastly, this chapter talks about ethical issues and how the researcher addressed them in the current study.

Chapter four is dedicated to the discussion of the findings. We begin by focusing on the trustworthiness, validity, and reliability of data. Statistical software such as SPSS, SmartPLS, and EViews is used to analyze the data. Statistical techniques such as

descriptive statistics, SEM, and logistic regression are employed to present the results in this chapter. After presenting the results using tables and figures, the findings were evaluated.

In chapter five, which is the final chapter of this study, the inferences of the outcomes in the preceding chapter (chapter four) are thoroughly discussed. Chapter five also presents recommendations for practice and research based on the research outcome. Finally, the last chapter presents the conclusion and take-home message of the entire research.

1.9 Summary of Chapter

This chapter was designed to introduce readers to the topic under investigation and the research problem that has necessitated the study. This chapter has clarified the problem of FinTech adoption hesitancy and the lack of understanding of the role of FinTech in influencing consumer behaviour, existing banks, and regulatory responses. Four research questions were generated based on the research problem, with the goal of clarifying and answering the research problem. In addition, based on the problem description, the chapter explained the aim of the research. The research questions were developed using the problem statement and the purpose of the study as a guide. In addition, the chapter discussed the study's relevance to policy making and future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The review of literature in empirical research is an important phase in the investigation process because it explores many critical aspects associated with the study and clarifies the ambiguity and difficulty of the study (Gray, 2009). A good and comprehensive literature review lays the groundwork and is essential to making a valuable contribution to research.

The current chapter presents a broad review of the literature. The literature review revolves around studies conducted in the area of financial technology, with specific emphasis on the research problem identified earlier in this study. Major themes examined as part of the literature review process include FinTech adoption; regulation of FinTech activities; the impact of FinTech on consumer savings and consumption; and the influence of FinTech on existing financial institutions. The main aim of the literature evaluation is to explore the scope of existing studies, which serves as a guide for the current research. The literature review also helps to ascertain and highlight the gaps in the existing literature in order to justify the need for the current research.

In this study, the review of literature is divided into three thematic sections: theoretical literature review, conceptual literature review, and empirical literature review. The theoretical literature review was undertaken to explain the main theories that underpin this study. Theories such as the technology acceptance model (TAM), the actor network theory (ANT), the extended post-acceptance model (EPAM), the theory of reasoned action (TRA), and the unified theory of acceptance and use of technology (UTAUT), among others, are the applicable theories in this research. The conceptual literature focuses on key

concepts relating to the topic of the study. Some of the main concepts examined include FinTech adoption; regulation of FinTech; the influence of FinTech on existing financial institutions; as well as the impact of FinTech on individual savings and investing behaviour. The empirical literature focuses on existing studies in the area of FinTech. The empirical literature review focuses on studies conducted in developed, emerging, and developing countries as well as Sub-Saharan African countries.

In order to obtain the relevant and current information as part of the literature review, various search engines were used. Some of the search engines and databases used to gather relevant literature include Science Direct, Google Scholar, JSTOR, and ProQuest Central. Literature on the main themes and theoretical framework was obtained by using key terms such as FinTech, financial technology, regulation, FinTech adoption, impact of FinTech on financial institutions, and impact of financial technology on consumers. Since these terms relate to the problem of the study and its theoretical framework, they provide the needed information required to do a comprehensive literature review on the topic under investigation. An effort was also made to review current literature on the subject of FinTech with the aim of ensuring that the literature review and its outcome reflected the latest findings on the subject under investigation. Fortunately, because the FinTech phenomenon is a new research area, much of the existing literature reviewed is very current and was published within the last five years. To ensure that important studies are included in the literature review, some studies that are considered old have been added as part of the literature review process.

2.2. Theoretical Framework

A theoretical background is important for guiding research, determining variables, and influencing data analysis (Fox, Gardner, & Osborne, 2018). A theoretical framework can be used to explain a phenomenon like technology adoption and its influence on consumers, banks, and regulatory responses. This section focuses on the theoretical framework that underpins the current study. Grant and Osanloo (2014) have opined that the theoretical underpinning of research provides a blueprint or a general guideline for conducting the study. The theoretical framework can also be described as the foundation that serves as a guide for the research (Adom et al. 2018). Sinclair (2007) and Fulton & Krainovich-Miller (2010) liken the theoretical framework to a map that directs the researcher and makes him/her stay focused without deviating from set objectives. There are a plethora of theories that can be considered when examining financial technology and its impact on key stakeholders. However, from the perspective of this research, the theories that are considered relevant include the Actor-Network Theory (ANT), the Technology Acceptance Model (TAM), the Extended Post Acceptance Model (EPAM), the Theory of Reasoned Action, and the Unified Theory of Acceptance and Use of Technology (UTAUT), innovation disruption theory, and the consumer theory. These theories and their relevance to the current study are explained in detail in the sections below.

2.2.1 The Actor-Network Theory

Callonand, Latour, and Law promoted the actor-network theory, which is also known as ANT (Beekhuyzen and Hellens, 2006). ANT is a theory developed to understand technological innovation (Shim and Shin, 2016). It illustrates how various players collaborate to establish and maintain a network. According to Shim and Shin (2016), these

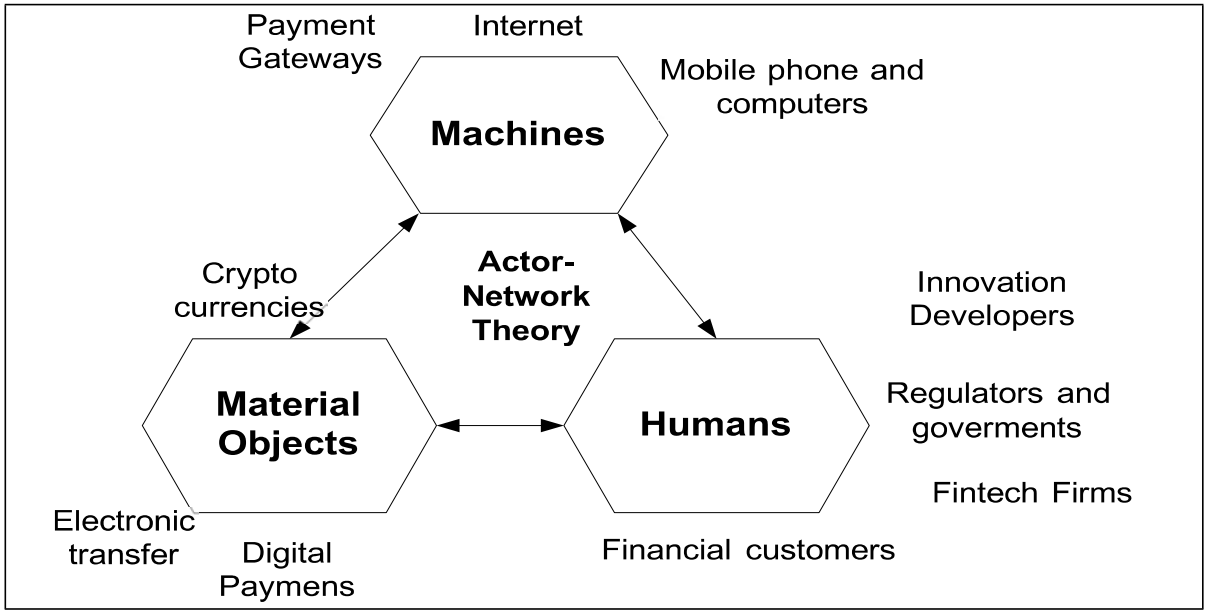
actors include both human and non-human actors who actively develop new technologies and contribute to shaping the development's outcome. The essential feature that sets this theory apart from others is that it considers people and technology to be playing equal roles in the network. It considers both human and non-human players to be equally important in the smooth operation of a network or system. Beekhuyzen and Hellens (2006) describe the ANT as an interdisciplinary theory that examines the relationship between technology and society. The key assumption of this theory is that the social world and the technical world are symmetrical and play equal roles in the realization of set objectives. According to Rose et al. (2005), technology and humans are both endowed with the capability to act within a network system. The ANT has been extensively applied to examine technology adoption in different jurisdictions. For instance, Beekhuyzen and Hellens (2006) used the Actor-Network theory to examine online banking adoption in Australia. Also, Shim and Shin (2016) also examined China's FinTech industry using Actor-Network-Theory.

Even though there are other competing theories, such as the agency theory, the stakeholder theory, and the social network theory, that seek to link various actors together, the actor-network theory is suitable for this study in several ways. First, since the current study focuses on FinTech, which may have social, economic, and political implications, and since the ANT makes assumptions to the effect that technologies contain economic, political, and social elements, it stands tall among other competing theories (Shim and Shin, 2016). Furthermore, it can be observed that whereas many studies, such as Lee et al. (2015) and Huang & Hsieh (2010), have applied the ANT theory in investigating ICT convergence, few studies have used this theory to examine FinTech within the Sub-Saharan African (SSA) environment. Third, unlike stakeholder theory, which focuses on human

actors in the network, the ANT encompasses both human and non-human actors, making it ideal for researching FinTech evolution, which covers technology, society, and other important regulatory bodies. Furthermore, the theory is appropriate for the current study because it demonstrates how human and non-human entities in the FinTech ecosystem interact with one another and affect one another in order for the FinTech ecosystem to function efficiently and effectively.

Figure 2.1 illustrates the ANT from a FinTech perspective and how the key actors within the FinTech ecosystem relate to each other. It can be observed that machines, humans, and material objectives combine and work in tandem to deliver a technological solution. FinTech firms, regulators, financial customers, and innovation developers constitute the human components that support the technology's development and maintenance. Payments gateways, computers, and mobile phones, as well as the internet backbone, constitute the machine aspect that is equally important for the network to function effectively. Finally, material objects in the form of electronic transfers, crypto-currencies, and digital payments are also critical to ensure that financial customers are able to use and benefit from FinTech innovations.

Figure 2.1: The Actor-Network Theory



Source: *Adapted from Beekhuyzen and Hellens (2006)*

2.2.2 Technology Acceptance Model (TAM)

The TAM was developed by Davis in 1989. It has become a commonly applied theory to clarify the precursors or drivers of innovation adoption. The Technology Acceptance Model (TAM) was created as a response to organizations' recurrent inability to successfully incorporate new innovations, despite rapid and unprecedented technological growth (Chuttur, 2009). The focus of the TAM model is to determine what will inform consumers' decisions to either accept or reject new innovations or technologies. According to the TAM, factors such as ease of use (EOU), perceived usefulness (PU), and beliefs and attitude influence a person's usage of technology. Perceived ease of use and usefulness of a technology are the key antecedents identified in the model. Perceived usefulness, according to Davis (1989, p. 320), is based on the perception that using

technology will improve performance and please customers better than existing methods. The second antecedent is "perceived ease of use," which describes the extent to which people perceive the use of new technology to be easy.

Yang and Yoo (2004) explain that TAM is a widely used theory for exploring the elements that affect the adoption of technology among individuals. However, despite the widespread acceptance and application of TAM, there has been some criticism against the model. According to Venkatesh (2003), the original TAM as described by Davies (1989) only focuses on two main dimensions, namely ease of use and perceived usefulness. Therefore, Venkatesh and Davis (2002) proposed the TAM2 by introducing two additional dimensions of technology acceptance. These are cognitive procedures and social impact. Again, the original TAM as developed by Davis (1989) focuses chiefly on ease of use and perceived usefulness, which only looks at the benefits or advantages of technology adoption without focusing on the impact of technological disadvantages such as trust and security concerns (Stewart and Jurjens, 2018). Thus, even though the TAM can provide a general framework for designing FinTech adoption, there is a need for a modification of the model to take into consideration FinTech-related factors affecting the adoption of technology. The current study examines the antecedents of FinTech adoption in Sub-Saharan Africa, and since FinTech adoption falls within the scope of technology adoption, the application of this theory will not be out of place. However, the wholesale adoption of this model may not be appropriate for two major reasons. First, this study is being conducted among people within SSA, where the environmental and socio-cultural dynamics are different from the environment in which the TAM was originally developed. Second, the factors that may affect FinTech adoption are multifaceted and may, therefore,

include multiple dimensions. The current study will propose additional dimensions that are likely to affect the adoption of FinTech products in developing economies.

2.2.3 The Extended Post Acceptance Model (EPAM)

The deficiencies associated with the original TAM theory by Davis have led to the development of other models that seek to explain the antecedents of technology adoption. One such model is the Extended Post Acceptance Model, which is a current model introduced by Lim et al. (2019). The EPAM theory combines the expectation confirmation theory (ECT) and the post-acceptance model (PAM). The two models together are often described as the EPAM. The focus of this model is to explain consumer behaviour after adopting new information technology. The ECT is a model suitable for longitudinal studies because it seeks to examine the attitude towards pre-adoption and post-adoption of information technology (Lim et al. 2019; Oliver 1981). The EPAM attempts to explain the extent to which the degree of fulfillment with a product affects the repurchase intention of the customer (Oliver, 1981). Bhattercherjee (2001) has also proposed an ECT model which seeks to explain the factors affecting the continuous use of an information technology solution. Lim et al. (2018) have therefore adapted the ECT and PAM models and have created a new model called the EPAM. This model is designed to clarify the acceptance of FinTech mobile services. The EPAM is developed around two important factors, which are: knowledge about FinTech services and perceived security (Lim et al. 2019). The knowledge factor examines how users understand and utilize information technology. The second factor focuses on security and its influence on FinTech adoption. A cursory examination of the EPAM model reveals that it happens to be one of the few models developed to evaluate the determinants of FinTech adoption, and since this study is about

FinTech adoption, this model would fit quite well with some aspects of the study's objectives. However, since the current study is cross-sectional in design and not longitudinal, the application of the EPAM model may not entirely help to achieve the aim of the study. It must be stated that the constructs used to conceptualize perceived security will be useful for the current study.

2.2.4 Innovation Diffusion Theory (IDT)

The IDT is one of the theories that describes the antecedents of technology or innovation adoption. The theory was propounded and popularized by Rogers (1995), who argues that innovation is an idea that individuals or groups perceive to be new and different from the status quo. Diffusion, on the other hand, is "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995, p. 5). Thus, Agarwal (2000) has opined that the decision of individuals to either accept or reject a new innovation is premised on their beliefs and perceptions about that innovation.

The IDT posits that the extent to which an innovation can be adopted or accepted is based on five key elements, namely "relative advantage, triability, compatibility, complexity, and observability" (Rogers, 1995). If an idea is considered superior to the one it replaces, then it is considered to have a relative advantage. The construct of relative advantage has been identified as a major factor that contributes to the adoption of innovative products or services. It is based on the economic gain users are likely to enjoy when such a service or product is adopted. Triability is concerned with the extent to which a new innovation can be experimented on a smaller scale before full adoption can take

place. Compatibility describes the nature of the new product or service and how it supports the values and expectations of the consumer. Complexity refers to the difficulties associated with the usage of innovative products. Finally, observability connotes the extent to which the new technology may be visible to consumers.

According to Lee et al. (2011), these qualities or attributes are perceived to be the antecedents of innovation adoption. In the past decades, a number of studies have applied the IDT in addition to other theories such as TAM, TRA, and EPAM, among others, to explain the antecedents of innovation adoption. The current study utilizes some of the components of IDT in addition to other theories to explain the drivers and inhibitors of FinTech adoption.

2.2.5 The Unified Theory of Acceptance and Use of Technology (UTAUT)

With many theories attempting to clarify the antecedents of technology adoption, there was a need to develop a model that integrates as many of these theories as possible to take advantage of the benefits associated with each of them. This call was responded to by Venkatesh et al. (2003), who proposed a model that seeks to unify about eight different technology acceptance models into one. This theory is called the "unified theory of acceptance and use of technology", popularly referred to as UTAUT. The theories brought together under this single umbrella include the model of PC utilization, TRA, the TAM, the TPB, the IDT, the social cognitive theory, and the motivational model (Venkatesh et al. 2003). Whereas UTAUT attempts to offer a more inclusive appreciation of the dimensions affecting technology adoption by combining different theories under one umbrella, the outcome becomes too complex to be adopted in this study. However, an

adapted version of the UTUAT is applied to ensure that all possible variables that could affect the adoption of FinTech in developing economies are considered.

2.2.6 Consumer Theory and Disruptive Innovation Theory

According to the consumer theory, a new product or service offering can act as a replacement if it can meet the same consumer needs as the previous service (Aaker and Keller, 1990). Based on this theory, FinTech firms may be the catalyst for such a competitive evolution due to their new and improved features that promote access to quality financial services while focusing on customers' needs (Ferrari, 2016). The consumer theory and the disruptive innovation theory can be used to explain how there can be competition between traditional players in the financial space and FinTech startups (Aaker and Keller, 1990). The theory asserts that new and innovative products, such as those offered by financial technology firms, can serve as substitutes for existing services if the former is considered superior to the latter. Start-up firms and innovation-oriented firms may provide a more convenient and cheaper service than existing offerings. Since consumers are interested in cost-effective and convenient services, among others, they may switch to the new start-ups for their products and services. Christensen (2013) has opined that "disruptive innovation is the process through which a smaller company, usually with limited resources, can challenge a larger company (often referred to as "incumbent") by entering at the bottom of the market and advancing up." This method is often broken down into many steps. First, the incumbent has designed their products and services so as to meet the needs of customers and to make as much profit as possible. Second, the entrant comes into the market and offers a similar product to that provided by the incumbent. The new entrants work to meet the needs of their customers at a lower cost and in a more convenient

manner. Third, the incumbent businesses initially pay less attention to the new entrants, choosing instead to focus more on their products and services and how they can increase their customer base. Fourth, the new entrants begin to attract some of the customers of the incumbents, thereby climbing the market share ladder gradually. Finally, a disruption is said to have occurred if the new entrants acquire a significant part of the market share of the incumbent.

In the view of Anagnostopoulos (2018), the presence of new entrants within the financial space can have dire consequences for existing financial institutions if they fail to respond adequately to the new entrants by competing favorably. Start-up businesses which use innovative technology to provide better, cheaper, and more convenient services than their traditional counterparts are more likely to attract customers and reduce the market share of the incumbents. Given that the current study, among others, assesses the influence of FinTech development on incumbent banks, this theory is useful for investigating how FinTech firms are gradually capturing customers within the financial space.

2.2.7 The Theory of Financial Intermediation

The purpose of financial intermediation theory is to explain the role of financial intermediaries and their significance in the financial market. Modern theories of financial intermediation seek to explain the main roles of financial intermediation, the effect of financial intermediation on the economy; how financial intermediaries manage risk; and the effect of financial intermediation on the regulatory regime. Various theories have been propounded to explain financial intermediation and the roles of financial intermediaries. Marty (1961) developed a financial intermediation theory based on information

asymmetry. They explain that the main role of financial intermediaries is to minimize information asymmetry within the financial sector to facilitate the movement of funds from surplus units to deficit units. Benston and Smith (1976) and Fama (1980) also explain financial intermediation by focusing on transaction costs. This way of thinking says that financial intermediaries work by reducing the costs of transactions in the financial market.

Allen and Santomero (1997) also introduced a new approach to financial intermediation by focusing on risk. The authors explain that financial intermediaries facilitate the transfer of risk and deal with complex financial instruments. They further indicate that whereas traditional financial intermediation theory focuses on institutions, modern financial intermediation theory focuses on the management of risk by financial institutions. The financial intermediation theory is important for the current research because both FinTech firms and traditional banks perform the financial intermediation role of transferring funds from surplus units to deficit units. They also manage risk and ensure that transaction costs are minimized as much as possible. However, the approach to dealing with the key functions of financial intermediation differs between FinTech firms and traditional financial institutions. FinTech companies use new ideas and technology to provide financial services, manage risk, reduce information asymmetry, and cut transaction costs, among other things.

2.2.8 The Public Interest Theory of Regulation

The "Public Interest Theory of Regulation (PITR)" provides a useful theoretical lens to appreciate FinTech regulation and its relevance within the FinTech and financial ecosystems. The theory, which is credited to Pigou (1932), is premised on two main

assumptions. First, a market that is not regulated is bound to fail as a result of possible monopolistic tendencies by market players that could negatively affect consumers. Second, the state has the capability to effectively correct failures in the market using regulatory frameworks. The theory provides a prescription regarding what ought to be done by the government and regulatory bodies to ensure smooth market operations. The theory posits that the government must intervene for a number of reasons. first, to ensure that monopolies do not impose high prices that harm consumers. Second, safety rules and standards are to be imposed to ensure that workers and the general public are protected from accidents related to fire, poisoning, and other negative externalities. Third, to ensure that financial service providers, insurance companies, and mutual funds do not cheat their investors.

This theory has become an important cornerstone for the modern financial sector, especially the fintech ecosystem. It is used to justify why it is important for a regulatory response within the FinTech space. Given that fintech products and services have some inherent risk, consumers must be protected through the application of regulations (Allais, 1947; Meade, 1948; Lewis, 1949). Despite its importance, the theory has been met with a number of criticisms. These criticisms are mostly championed by the "Chicago School of Law and Economics." First, the opponents of this theory posit that the market has its own self-correcting mechanisms that will kick in once market irregularities are detected, and therefore government intervention is not necessary. Second, in situations where the market will not work to the satisfaction of market players and participants, the legal system or litigation can be invoked to address these imperfections. Third, the opponents of the theory insinuate that even if the market is unable to correct imperfections and that litigation will not help, the government is not competent to regulate the market.

Since the current study also focuses on the regulatory responses to FinTech regulation, the PITR is important as it provides a framework for assessing the relevance or otherwise of regulatory intervention within the FinTech space. For example, given the risks that come with FinTech services, should the government step in or let the market self-regulate through self-correcting mechanisms and lawsuits?

2.2.9 Outcome of Theoretical Review

A number of theories have been reviewed in this study. However, unlike the stakeholder theory and the social network theory, which focus on human actors in the network, the ANT is made up of both human and non-human actors, and hence suitable for studying FinTech evolution. The theory best fits the current study because it shows how human and non-human players within the FinTech ecosystem relate to each other and influence one another towards the efficient and effective functioning of the FinTech ecosystem.

Among the theories that seek to explain the antecedents of technological acceptance, the TAM model has been described as one of the most widely used models. However, Wang et al. (2003) explain that despite its wide application in other areas, few studies have attempted to use it to examine internet banking and financial technology. Also, Stewart and Jurjens (2018) opine that TAM has not been actively applied to investigate the FinTech phenomenon. Furthermore, the application of TAM in FinTech may be problematic since the original TAM as developed by Davis (1989) provides emphasis on the "usefulness and easiness of use" without considering possible constraints that could undermine the utilization or acceptance of information systems. Thus, TAM focuses more on the

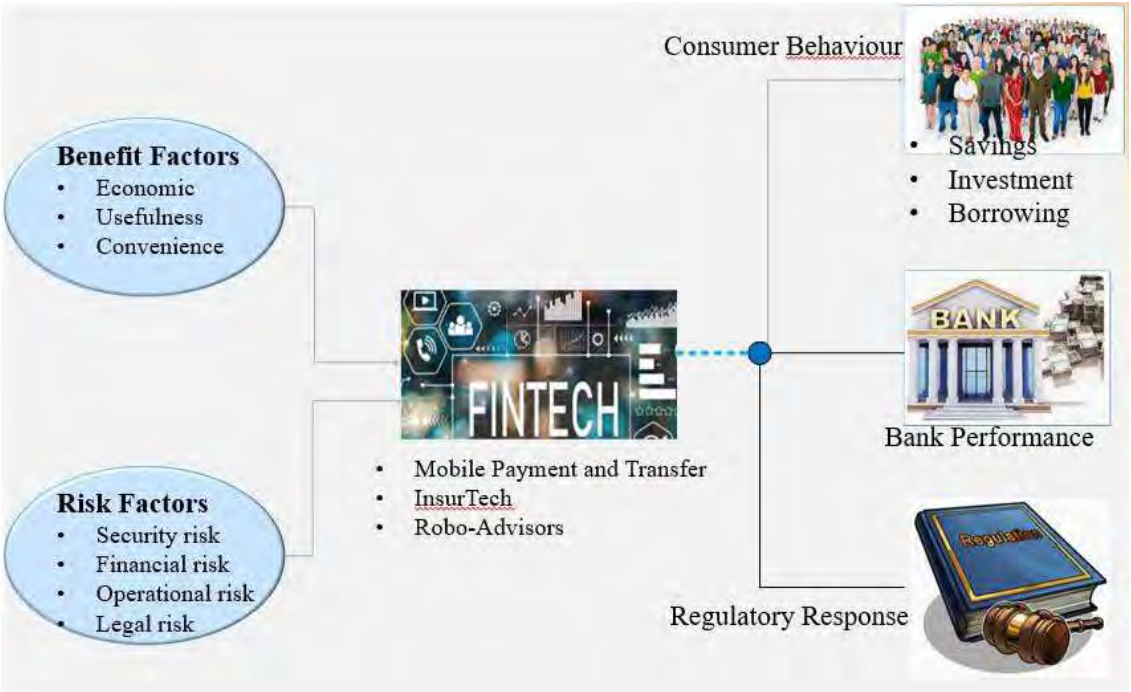
perceived benefit factors that may influence technology acceptance, neglecting the perceived risk factors. Furthermore, Liu et al. (2009) have questioned the relevance of TAM within the context of mobile banking.

While TAM and other technology acceptance models have provided a general framework for understanding technology acceptance, their application in the FinTech environment necessitates some modification (Stewart and Jurjens, 2018). Also, McCoy et al. (2017) have observed that the TAM, which was originated from the United States of America, may not be applicable universally since the attitude of different cultures towards technology use may differ significantly. Studies such as Lauren and Lin (2005) and Liu et al. (2009) have underscored the importance of security and trust in investigating technological adoption. As a result, including these dimensions in the investigation of FinTech adoption is not out of place. Other studies have also examined the user interface as part of explaining the security dimensions (Landford, 2006). From the review of the various theories and their deficiencies within the context of the FinTech phenomenon, the current study adopts the model developed by Stewart and Jurgens (2018), which includes dimensions such as perceived ease of use (PEOU), perceived usefulness (PU), data security, customer trust, and user design interface. Since the current study also focuses on the regulatory responses to FinTech regulation, we further consider the PITR as an important framework for assessing the relevance or otherwise of regulatory intervention within the FinTech space.

2.3 Conceptual Framework

This sub-section provides an elaborate explanation of the main constructs for this study, such as Financial Technology (FinTech), FinTech Adoption, FinTech Regulation, household financial behaviour, bank performance, and regulatory response. Figure 2.2 provides a description of the relationship between the study concepts.

Figure 2.2 Concepts and their relationships

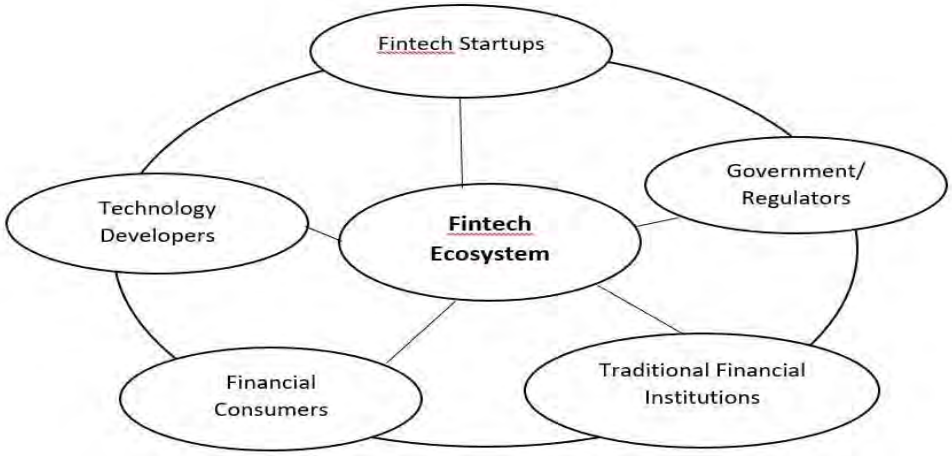


2.3.1 Financial Technology (FinTech) Ecosystem

A proper understanding of the conceptual framework and the main constructs of this study requires an initial explanation of the FinTech ecosystem. The FinTech Ecosystem (FE) involves a complex network of various actors that work and interact in tandem to offer tailor-made, innovative financial services to consumers. According to Lee and Shin (2018), the FinTech ecosystem is comprised of five main participants, which include FinTech startups, government and regulatory bodies, traditional financial

institutions, technology developers, and financial customers. The financial customers comprise individuals and organizations that access and use FinTech services in one way or the other. FinTech developers handle technical issues relating to FinTech such as cloud computing, cryptocurrency, and big data analytics. FinTech firms manage payments, lending, crowdfunding, insurance FinTech, and wealth management, among other services (Lee and Shin, 2018). The government and its agencies, such as regulators and legislators, play an important role within the FinTech ecosystem by ensuring that financial services provided by FinTech firms are regulated to promote financial inclusion while at the same time protecting consumers and safeguarding the financial system. Existing financial institutions, including banks, insurance companies, venture capitalists, mutual funds, and stock brokerage firms, are also an important part of the FinTech ecosystem since their activities are affected, either positively or negatively, by FinTech startups (Pwc, 2017). For the FinTech ecosystem to function efficiently and deliver the desired results, these elements must complement each other in a symbiotic manner. Figure 2.3 depicts the five main components of the FinTech ecosystem.

Figure 2.3 Elements of the FinTech Ecosystem



Source: Adapted from Lee and Shin (2018)

This thesis examines three components of the FinTech ecosystem: FinTech consumers and users, government and regulators, and traditional financial institutions. These elements are considered because they provide the basis for answering the research questions. With regards to FinTech consumers or users, we examine the factors affecting the acceptance of FinTech offerings by consumers. These factors may be categorized into economic, personal, security, and technical. Also, demographic factors such as age and level of education are examined to ascertain the extent to which they moderate FinTech adoption and usage (Abdinoor and Mbaba, 2017). The second element, which is FinTech regulation, focuses on regulatory responses to the FinTech evolution. Also, the growth of FinTech could have a positive or negative effect on traditional financial institutions, especially traditional banks. This needs to be looked into.

2.3.2 Financial Technology (FinTech)

The World Bank (2018) has observed that a significant number of people throughout the world lack access to financial services, even though major strides have been made in economic development. Demirguc-Kunt et al. (2018) have also found uneven access to financial services globally. FinTech is a technological innovation that has emerged to address these issues. FinTech has increased the number of consumers who can access financial services while also bridging disparities in access to financial services (World Bank, 2018). Financial Technology, popularly referred to as FinTech, is becoming a popular term in the modern financial lexicon. It is a new term that fuses finance and technology. The term FinTech, or financial technology, is used in different forms in the extant literature. For instance, FinTech, Fin-Tech, or fin-tech are some of the styles used

by some authors and various studies. As far as this study is concerned, "FinTech" will be used. We also distinguish the term "FinTech" from FinTechs or FinTech firms. We use FinTech to describe the combination of technology and finance, while FinTech firms or FinTechs are used to describe companies that use technology to deliver financial services (Knewtson and Rosenbaum, 2020).

Financial services have evolved substantially in recent decades, owing mostly to technological advancements in information technology systems and financial activities. Financial innovations have influenced the processes leading to the delivery of financial services as a result of technological advancements (Frame et al., 2019). Although the term "FinTech" is a relatively recent phenomenon, it has been widely used in business and finance literature. However, there is no consensus on its definition and interpretation. Some authors characterize it in terms of companies that provide innovative services, while others define it in terms of the use of the internet in financial services. This variation in the definition of FinTech isn't always a problem, given that different businesses and individuals have varied interpretations of the term. As a result, some authors have opined that each researcher should describe and clarify the term FinTech in the context of his or her research. Table 2.1 shows the different ways that FinTech has been described by different authors.

Table 2.1 Definition of FinTech by different authors

Author	**Definition**
PwC (2016, p. 1)	*"the evolving intersection of financial services and technology"*
"Das (2019, p. 981)"	*"any technology that removes or reduces the costs of financial intermediation"*
"Gai et al. (2018)"	*"FinTech has become a common phrase in the in finance to denote new technology employed by financial institutions"*
"EU Parliament"	The EU parliament describes FinTech as *"finance enabled by new technology"*
"IOSCO"	IOSCO defines the concept as *"a variety of innovative business models and emerging technologies that have the potential to transform the financial services industry."*
"Leong & Sung (2018)"	*"any innovative ideas that improve financial service processes by proposing technology solutions according to different business situations, while the ideas could also lead to new business models or even new businesses*"
"The FSB (2017)"	*"technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services"*
"Demirgüç-kunt et al., 2018"	*"It has also been described as the provision of financial services with the aid of technology such as mobile phones and other technological devices"*

FinTech, as defined by PwC (2016, p. 1), is the "evolving intersection of financial services and technology." This definition basically sees FinTech as the use of technology in financial services. The definition by Das (2019, p. 981) describes the economic benefits derived by the use of FinTech services. While we agree with the definition of Gai et al. in part, the definition does not mention non-financial institutions and MNOs, which are key

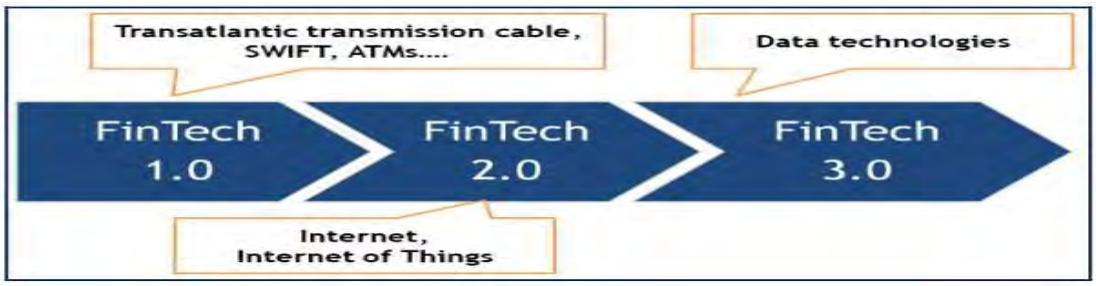
actors within the FinTech ecosystem. The definition by the EU parliament, which describes FinTech as "finance enabled by new technology," is not different from the one provided by PwC. IOSCO defines the concept as "a variety of innovative business models and emerging technologies that have the potential to transform the financial services industry". The definitions by IOSCO take into consideration innovative financial products and services on the one hand and innovative business models on the other hand. Put differently, the definition includes not only the innovative products and services but also the new business models that have changed the financial landscape. However, the definition fails to link financial innovation with business models. Leong and Sung (2018) provide a more comprehensive definition of financial technology by describing it as "*any innovative ideas that improve financial service processes by proposing technology solutions according to different business models, while the ideas could also lead to new business models or even new businesses*" (p.75). The FSB (2017a) also defines financial technology as "technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services". For purposes of this study, the definition by the FSB is adopted. This is because it provides all the necessary ingredients for this study and its objectives, including regulation, the nature of FinTech, and adoption. This study defines financial technology as the use of technology to make new financial products and services, as well as to create new business models and processes that improve the way financial services are delivered and can have a big effect on existing financial services.

FinTech is gaining momentum in both developed and underdeveloped economies because it has the potential to reach communities and individuals that are financially excluded (AFI, 2016). FinTech products and services such as mobile money payments, e-wallets, crowdfunding, and cross-border remittances are helping to reach underserved communities. Though the concept of FinTech is relatively new, the use of technology and innovation within the financial sector is not a recent phenomenon. The current surge in the growth of FinTech services has been motivated by their importance to consumers and the general economy. According to Ozili (2018), the evolution of the FinTech phenomenon has significant implications for consumers and the economy as a whole. The author explains that FinTech has significantly impacted on the economy as economic growth has been improved via the delivery of a wide variety of financial services for individuals and small businesses. Also, the availability of financial services to economic units reduces the informal economy and therefore improves tax mobilization (Manyika et al. 2016). Furthermore, some of the FinTech services encourage savings, which promotes savings in financial terms rather than the "under the mattress" type of savings. Again, FinTech has introduced new business models that have helped improve access to loans and other financial services. The authors further observed that financial technology and digital finance prove efficiency within the global financial system and provide better monitoring by regulators. In addition to the macroeconomic benefits, there are microeconomic benefits as far as FinTech innovation is concerned. First, it has been observed that financial technology promotes financial inclusion (Sapovadia, 2018; World Bank, 2018; Jack and Suri, 2014) within the economy, especially in rural areas. Ozili (2018) further explains that FinTech provides an affordable way for the unbanked to access financial services within

the economy, and it provides a convenient way of undertaking financial transactions and making payments. Finally, Ozili (2018) observes that FinTech innovation reduces the cost of the operation of lenders and makes it possible for the provision of financial resources to small businesses.

Financial technology is often described as a new phenomenon, even though it has been operating in different forms within the financial arena for some time. It has been transformed from one level to another due to technological advancement. Three main eras of FinTech can be identified. The introduction of mainframe computers and their applications, coupled with the breakthroughs in the Trans-Atlantic transmission cable, ushered in what is often called FinTech 1.0. Shortly after FinTech 1.0, FinTech 2.0 was introduced through a breakthrough in technologies such as SWIFT and ATM. These technologies make it possible for funds to be transferred through the use of internet technology. FinTech 3.0 emerged as a result of advancements in big data technologies, high-speed internet, and communication technology. FinTech 3.0 supports digital financial services such as fund transfers, digital currency, and digital payments, among others (Leong and Sung, 2018). Figure 2.4 depicts the various FinTech eras and the associated technologies.

Fig 2.4. Diagrammatic illustration of FinTech evolution and associated products/services



Source: Adapted from Leong and Sung (2018)

Figure 2.5 depicts the evolution of FinTech over the past period. It may be dated back to 1865, when the discovery of pan-telegraphy made a breakthrough in the financial industry. Following that, in the 1800s, customers began exchanging items with businesses using charge plates and credit coins. Modern credit cards and ATMs were introduced in the 1950s and 1960s, gradually moving financial services from analogue to digital. In 1973, SWIFT was founded, which has aided in the resolution of problems connected to international transactions via telecommunication. During the 1990s, there was also a surge in online banking and e-commerce (Arner, et al. 2016). However, following the global financial crisis of 2007–2008, new FinTech innovations emerged. This includes the 2009 launch of cryptocurrencies such as Bitcoin. Furthermore, the retail financial sector is also seeing growth, with online banking being conveniently accessible via mobile phones (Desai, 2015).

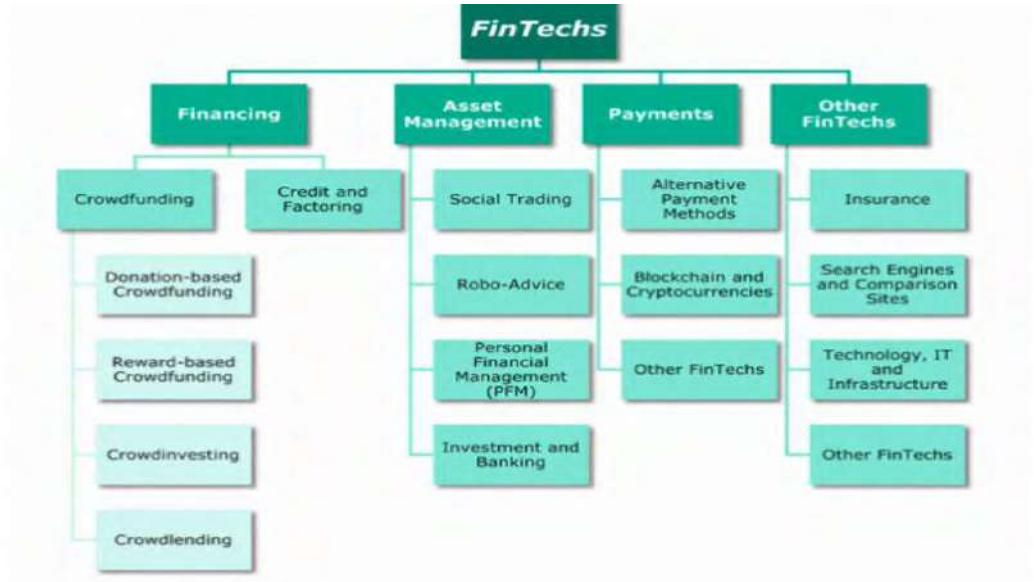
Figure 2.5 Tracking the History of FinTech Innovation

2.3.3 FinTech Business Models

Various FinTech business models have been developed to provide efficient, easy, and convenient financial products to financial clients. These models have been developed in the areas of investment, funding, payment transfers, and asset management, among others. Shin and Lee (2018) propose six main business models for FinTech. These include payments and transfers; investment; wealth management; lending; crowdfunding; capital

market lending; and insurance services. Figure 2.6 describes each of the FinTech business models and their sub-components.

Figure 2.6: FinTech Business Models



Source: Adopted from Shin and Lee (2018)

One important aspect of finance that has had a significant impact over the years is asset management. Traditionally, the asset management role, which is designed to provide advisory services to investors on how to maximize their investment return subject to possible risks, has been performed by asset management firms and investment banks. However, in recent years, the FinTech industry has made a significant incursion into this role by providing automated advisory services to financial consumers at relatively cheaper prices. Asset management FinTech platforms are intended to provide financial support and advice on how wealth can be managed. This FinTech model creates automated wealth managers who provide advice on wealth management, portfolio management, and investment decisions, among others. This technology is often described as "robo-advisors."

Based on the preferences and characteristics of the investor, these Robo-advisors apply some form of algorithm to suggest investment and portfolio strategies to the investor. According to Holland FinTech (2015), there has been a significant shift towards robo-advisors because of changing demographics and low fee structures. In a survey organized by the Chartered Financial Analysts (CFA) in 2016, it was observed that a substantial number of the participants believed Robo-advisors could disrupt the activities of companies offering investment and wealth management advisory services. Robo-advisor platforms have become technological advisory platforms that are poised to gain prominence over human advisors. Based on the input provided by the investor, artificial intelligence-powered algorithms will offer an investment portfolio that suits the investor's individual requirements. Robo-advisors deliver customized services in this way. Furthermore, robo-advisors offer financial advice on demand, resulting in shorter wait times and lower prices (Foerster et al., 2017). Rossi and Utkus (2019) have opined that in the US, robo-advisors have encouraged investment, savings, and borrowing and have significantly reduced cash holdings.

Furthermore, household investors who employ robo-advisors see an increase in portfolio diversification. D'Acunto et al. (2019) used data from brokerage firms in India to show that robo-advisor adopters and non-adopters had similar characteristics and had in the past engaged with human advisers. Adopters, on the other hand, are more engaged and manage a larger quantity of assets. The authors discovered that individual investors who took advantage of robo-advisors performed better in their portfolio management compared to those who did not. Investors with previously diverse portfolios saw reduced volatility and traded more.

Despite the benefits highlighted above, Jung et al. (2017) found that general public acceptance of robo-advisors has been poor. The people who would gain the most from robo-advisors are inexperienced individuals with limited financial resources. However, these people are still not taking advantage of robo-advisors. This could be due to a combination of issues, including a lack of trust in the process as well as a reluctance to engage in investment activities. To make it attractive for individuals and groups to adopt and continue to use robo advisors, the platform must be designed to enhance the user experience. For example, Hohenberger et al. (2019) found individuals with more self-reported financial expertise have fewer problems with robo-advisors and are more likely to utilize them in the future. Belanche et al. (2019) also emphasized the importance of household attitudes and subjective standards.

Another major business model of financial technology is transfer and payment, which includes both retail and wholesale money payment and transfer. Compared to traditional payment systems, FinTech payment systems are easy to use and highly convenient. According to Mellon (2015), FinTech payments can come in a variety of forms, including "peer-to-peer (P2P) mobile payments, foreign exchange remittances, digital currency solutions, real payments, and digital currency". Lee and Shin (2018) have also posited that the main advantages of FinTech payments include convenience, speed, and low transaction cost.

Crowdfunding is another FinTech business model that is designed to empower individuals to undertake business activities through the raising of funds. Traditionally, the decision to grant loans to individuals and businesses to help their operations has been made

by traditional financial institutions (Magnuson, 2018). However, with crowdfunding, technology can be used to source funding from hundreds of individuals and corporations to facilitate business activities Crowdfunding is a new mode of financing for entrepreneurs that has grown rapidly in recent years. It is estimated that between 2015 and 2016, crowdfunding transaction volumes rose from EUR 130 billion to EUR 262, up by 208% (Ziegler et al., 2018). Instead of requiring money from a few donors, crowdfunding allows businesses to obtain funding from several people for a very small amount (Belleflamme et al. 2014). This transaction is frequently carried out online without the use of traditional banking intermediaries (Mollick, 2014). According to Magnuson (2018), crowdfunding FinTech has now made it possible for individuals and businesses to access capital without relying on banks and other financial institutions. As a result, there has been a significant change in the way capital allocation is currently undertaken within the market. The major advantage of FinTech within the lending space is that it has lowered the cost of accessing funds and has made it easier for businesses and consumers to access funds. In recent years, FinTech firms have pioneered crowdfunding innovations, where businesses can raise funds from large groups of people through an internet portal. Today, crowdfunded FinTech companies continue to make incursions in the areas of debt and equity financing. The low cost of raising funds coupled with the convenience associated with the process has resulted in the massive growth of the crowdfunding sector (Magnuson, 2018). According to the World Bank, the amount raised by crowdfunding companies in 2014 was $16.2 billion, and this is expected to increase to $96 billion by the year 2025 (World Bank, 2018).

In crowdfunding, three key parties are involved: the entrepreneur, the contributors, and a moderating organization (Lee and Shin, 2018). The entrepreneur, or sometimes

described as the project initiator, is the one who seeks to raise funds to support a business venture. The contributors are individuals or organizations seeking to support the idea or the project initiator, while the moderating organizations work to ensure that the engagement between the project initiator and the contributors is facilitated. The moderating organization is also tasked with the responsibility of ensuring that contributors are given the necessary information to assess the various crowdfunding initiatives. Crowdfunding can be looked at in three main forms. These are "reward-based crowd funding, equity-based crowdfunding, and donation-based crowdfunding".

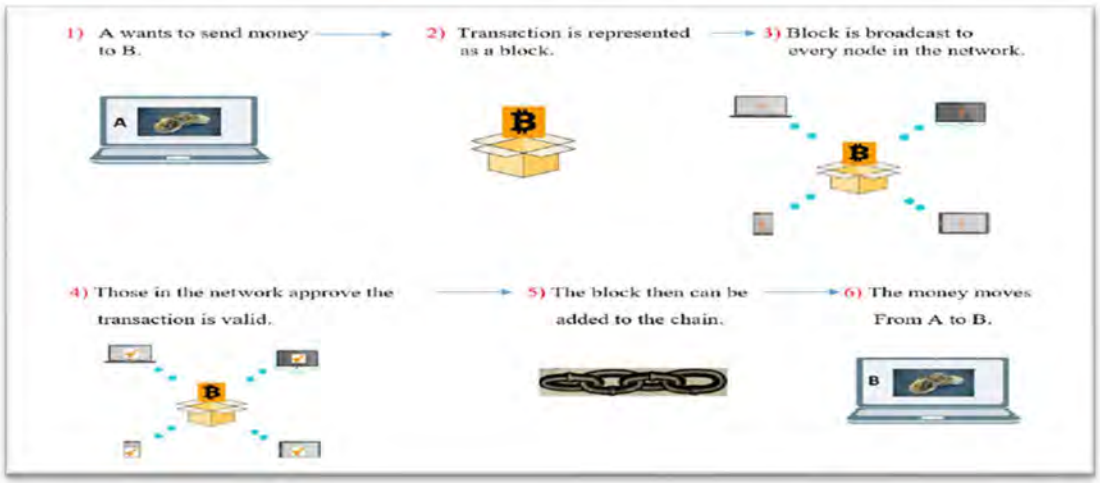
In reward-based crowdfunding, businesses, especially SMEs, raise funds for their businesses by either paying some interest on the money raised or making the contributors part owners of the business and rewarding them through dividends and other means. In the initial stages, the project initiator or the entrepreneur sets the interest rate to be paid to the contributors out of the proceeds of the business. This interest is set based on the entrepreneur's ability to pay and the payment he/she can guarantee (Mollick, 2014). In donation-based crowdfunding, charities source funds to champion a worthy cause within society. In this FinTech model, the contributors do not receive any form of monetary reward, except non-monetary recognition. The third form of crowdfunding is equity-based funding. This model is particularly appealing to small and medium-sized enterprises (SMEs) since it provides them with the opportunity to raise equity funds to boost production and expand their operations. It helps SMEs obtain funds from investors who are interested in owning part of such businesses. This method is especially attractive to private businesses because it lets them get the money they need to run their businesses, which they usually can't get from traditional banks.

Another significant trend in FinTech is peer-to-peer (P2P) lending (Lee and Shin, 2018). In P2P lending, the FinTech firm facilitates lending between individuals and businesses. Compared to traditional financial institutions, P2P FinTech firms can offer a lower interest rate than traditional financial institutions. Technically, FinTech firms are not involved directly in lending money but rather set up systems and technology platforms that promote lending among individuals and businesses. Put differently, this FinTech business model simply matches borrowers with lenders and collects fees for their effort. Since these FinTech firms are not directly involved in the lending process, they are not required to meet the capital requirement as compared to traditional financial and lending institutions (William-Grut, 2016). The unique advantages of FinTech lending include the development of alternative credit scoring models; analysis of data online to effectively price risk; a faster and more efficient lending process; and comparatively lower transaction costs (Lee and Shin, 2018). There are also FinTech models that support the capital markets. Areas such as investment, risk management, trading, and foreign exchange. Among these models, one that has gained much popularity is trading. FinTech trading connects investors so they can share ideas, place orders, and trade commodities and stocks (Lee and Shin, 2018). It also provides a platform for monitoring risk within the capital market.

Magnuson (2018) explains that aside from challenging virtually all facets of traditional finance, some FinTech business models are now boldly challenging the structure of the currency itself. Traditionally, the processes leading to the creation and supply of currency within the economy have been the sole preserve of central banks. However, this traditional role of central banks is currently being challenged by the introduction of virtual currencies. According to Magnuson (2018), virtual currency is a form of electronic

currency that is created and stored using digital technology. The idea of virtual currency is to decentralize payment systems using peer-to-peer networks, popularly referred to as blockchains. A simple illustration of how virtual currency is used to make a payment is illustrated in Figure 2.5. In this illustration, a payment from A to B is broadcast through the peer-to-peer network in the form of a block. All computers on the network assess and authenticate the transaction as valid. Once authenticated, the block is recognized and added to the chain, which paves the way for the money to move from A to B. The simple illustration, as depicted in Figure 2.7, shows that no third party or financial institution is serving as an intermediary, thereby reducing the transaction cost associated with making and receiving payments. Over the years, several virtual currency platforms have emerged, but the most popular so far has been Bitcoin (Magnuson, 2018). This virtual currency is now widely used to undertake transactions in different markets. Launched in 2009, the average transaction value of Bitcoin in the US is now approximately $30 million, and this is expected to rise substantially in the coming years.

Figure 2.7: Diagrammatic illustration of how a blockchain works



Source: Crosby et al., 2015

Another important area of finance where FinTech is making a significant impact is the insurance sector. The IAIS (2017) describes FinTech in insurance (insurtech) as the application of technologies to develop new business models and services that enhance the insurance business. FinTech firms have developed an insurance business model where there is direct interaction between the insured and the insurer. In addition to promoting direct interaction among the parties in the insurance business, FinTech uses a technology known as data analytics to estimate and match the risk. Popularly referred to as insurtech, they provide services such as insurance premium comparison sites and other apps to facilitate easy transactions (EY, 2019). Insurtech seeks to apply technological innovations to the traditional insurance process with the view of improving efficiency and minimizing cost. Inspired by the term FinTech, insurtech is a combination of the words "insurance" and "technology." Insurtech is pursuing opportunities that big insurance companies have less interest in adopting, such as the use of technology to provide financial services in a cost-effective manner (EY, 2019).

2.3.4 FinTech Adoption

One of the most important areas that has piqued the interest of researchers within the FinTech field is the antecedents of financial technology adoption. Questions about the main factors motivating the adoption of FinTech by financial consumers and those that serve as inhibitors of FinTech adoption have been raised (Stewart and Jurjens, 2018). In addition to these questions, the extent to which security and trust affect the adoption of FinTech innovations has been discussed in the extant literature (see Stewart and Jurjens, 2018; Abdinoor and Mbaba, 2017). According to EY (2019), consumers are becoming more aware and are adopting more FinTech services in recent years. EY indicates that the

high degree of adoption is as a result of consumers' likeness for the products offered by FinTech Services. It is further indicated that the adoption of FinTech services, which was hovering around 16% in 2015, has now increased to 64% in 2019, and this is envisaged to increase further in subsequent years. The survey by EY further revealed that at least 96% of financial consumers know of one or more FinTech services that are available in the world today. Figure 2.8 presents the common FinTech services and the level of awareness. It can be observed from Figure 2.8 that only 4% of customers are unaware of money transfer and payment FinTech services. With regards to the other FinTech services shown in Figure 2.8, it is observed that at least 70% of financial consumers are aware of these products. The result indicates that the level of awareness of FinTech services is extremely high.

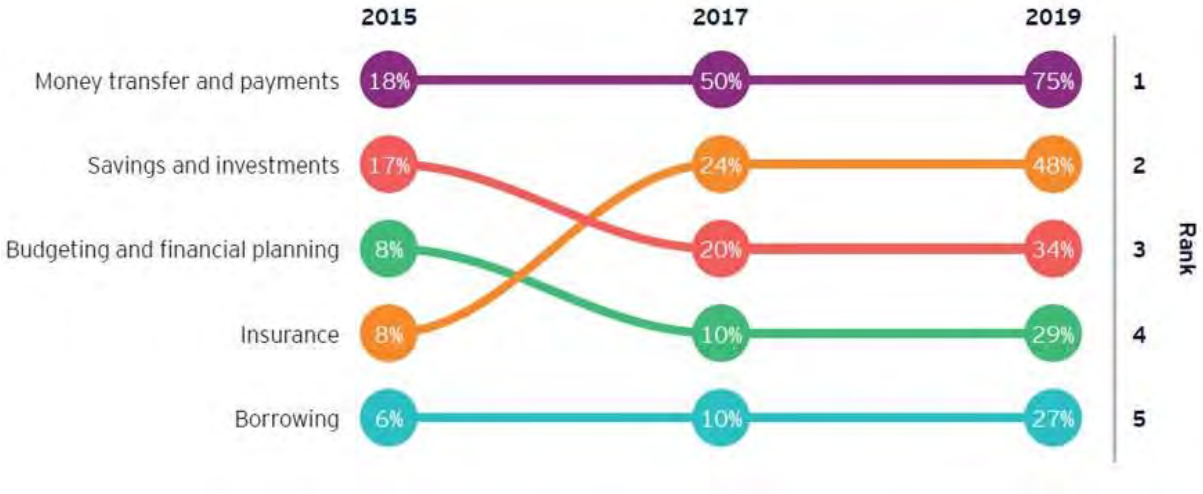
Figure 2.8: Level of awareness of various FinTech business models

Source: Adopted from EY (2019)

In addition, it can be gleaned from Figure 2.9 that since 2015, the adoption rate of the major FinTech services has been increasing steadily. Money payment and transfer FinTech saw the adoption rate increase globally from 18% in 2015 to 75% in 2019. Consumer adoption of FinTech services relating to savings and investments also witnessed a jump in consumer adoption from 17% in 2015 to 34% in 2019. Consumer adoption of

budgeting and financial planning FinTech also witnessed a significant increase, from 8% in 2015 to 29% in 2019. Insurtech and borrowing platforms also recorded increases in consumer adoption within the same time period. This result supports the assertion that FinTech services are receiving widespread acceptance by consumers.

Figure 2.9: Comparison of FinTech services and their percentage of adoption since 2015



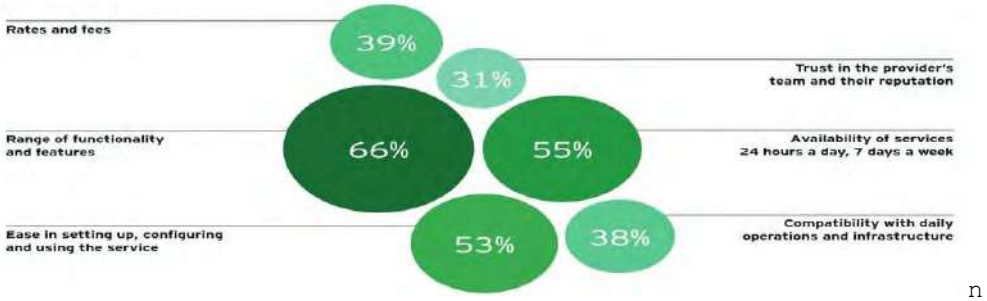
Source: Adopted from EY (2019)

Whereas a substantial improvement in the level of acceptance of FinTech products and services has been recorded, the factors influencing the adoption of these products need to be examined in the literature. There are mixed findings in the extant literature regarding the variables which affect the acceptance of FinTech services. In a study conducted by EY (2019), they observed that security is not a major determinant of FinTech adoption. This is in sharp contrast with the findings by Stewart and Jurjens (2018), who observed that security and trust are the major determinants of FinTech adoption among German household consumers. Lyman and Laur (2015) have also identified six factors they believe affect the adoption of FinTech services. These include network failures and security

concerns; the level of complexity of FinTech services; the cost of FinTech services; fraud; transparency issues; and data protection and privacy concerns.

EY (2019) explains why people choose to use FinTech services instead of the banks that are already in place. They identify five major reasons, which include the cost of financial services (rates and fees), the reputation of the providers, the availability of financial services on demand, the range of functionality and features, the ease of configuring and applying these services, and the compatibility of infrastructure and daily operations. The study revealed that the wide variety of services and features offered by FinTech firms is the most important reason why financial consumers choose FinTech firms over incumbent financial institutions. The result indicates that 66% of consumers choose FinTech firms over banks because of the wide range of functionality and features provided by these firms. The second most important reason is the 24/7 availability of FinTech services provided by FinTech firms. According to the study, the third most important reason why consumers choose FinTech firms over incumbent banks is that FinTech services are easy to relate to and use. Figure 2.10 presents a summary of the findings from the study by EY (2019)

Figure: 2.10 Survey of reasons for FinTech adoption



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Source: EY (2019)

2.3.5 Drivers of FinTech Growth

According to existing studies on FinTech adoption, the creation and development of FinTech environments and enterprises in recent years can be linked to a number of enablers. This research identifies four primary variables that are fueling FinTech growth. First, owing to the technological advancement being experienced globally, customers' expectations of the traditional banking system's services have shifted. Customers' demands are growing increasingly demanding in terms of the services that banks should provide (Paulet and Mavoori, 2019). Financial technology companies have achieved technology improvements that can increase efficiency in the financial arena while simultaneously lowering the cost of delivery. Incumbent financial institutions (such as banks) are still struggling to be efficient, whereas FinTech enterprises are already offering financial services in an effective way. As a result, the pool of financial service users has tremendously expanded, promoting financial inclusion (Anagnostopoulos, 2018).

In the view of Teixeira and Piechota (2019), "technology is not disruptive in and of itself"; rather, the ultimate disruptors are changing consumer habits and demand. Traditional banks continue to rely on old and expensive information technology infrastructure to provide services to their customers. At the same time, FinTech start-ups and MNOs can provide quick services and minimize transaction costs at the same time (Agarwal and Chua, 2020). Customers also enjoy convenience, as the majority of transactions are completed using internet-based platforms without the need to visit financial institutions (Sangwan et al., 2019). The changing needs of consumers are seen as a major factor in the growth of FinTech.

The second thing that has been pointed out as a major driver of FinTech growth is the fast growth of technology, or information technology. In view of the rapid growth of hardware, software, and other technologies during the last two decades, FinTech companies have developed and continue to evolve (Dapp, 2014). The internet, smart devices, mobile communication, and cloud technology have aided the growth of new financial structures, causing disruption in industries such as tourism, entertainment, and financial services (Drasch et al., 2018). New technologies powered by the internet have made it possible for different FinTech platforms to be created to support the financial sector (Li, 2020; Das, 2019).

The third reason driving the FinTech sector's rise is the ease with which one can enter the financial market. One of the key elements that has enabled FinTech companies to quickly enter the financial services industry is the much reduced regulation for financial services delivered by non-banks and FinTechs (Thakor, 2020). Traditional banks are dealing with a more stringent regulatory environment, which is putting a huge strain on their operations (Vives, 2017). Following the financial meltdown of 2008, banks were faced with higher capital requirements and stricter lending criteria, making credit more difficult to get for small businesses and individuals, "resulting in an unmet demand for financial services" (Thakor, 2020). Consequently, while banks have been preoccupied with abiding by laws, policies, and strict standards, FinTech firms have been seeking to build their businesses by utilizing technology to provide customers with novel financial services. FinTech firms are also more prepared to take on greater risk compared to regulated banks to unbundle financial services through the deployment of innovative technology since they appear to be unencumbered by regulatory limits. (Kumar, 2016). FinTech companies can

easily adapt to changes in the business and regulatory environment because of how easy it is for them to do business.

From the preceding arguments, it is obvious that FinTech firms have a friendlier regulatory regime than their banking counterparts. Whereas FinTech firms and traditional banks appear to be competing for the same financial customers, FinTech firms have an advantage over traditional banks due to the minimal regulatory requirements for FinTech start-ups. Knight (2017) examined the nature of FinTech regulation of FinTech firms in the United States and found that a substantial number of FinTech firms operated beyond state lines yet were subject to state-level regulations. Traditional banks, according to Knight (2017), are more highly regulated than FinTech startups. Indeed, the banking system is the target of the majority of financial regulations. According to Galhau (2016), it is vital to ensure that both FinTech firms and traditional banks are subjected to the same regulatory framework since they offer the same financial services.

Finally, the expansion of investment in the sector can also be described as an important enabler of FinTech growth. Immediately after the 2008 financial crisis, investors began to turn their attention to the FinTech sector (KPMG, 2020a). These investors supported FinTech firms and startups to innovate and introduce new, innovative financial products into the market. This has led to significant growth in investment in the sector over the past decade and a half. According to KPMG (2020a), investments in FinTech related activities increased from $51.2 billion in 2014 to $135.7 billion in 2019. During the same time period, the number of deals increased significantly from 1,628 to 2,693. KPMG (2020a) has further argued that there has been significant within the FinTech ecosystem

over the past five years and this is expected to continue. As a result of these massive investments, FinTech firms have grown in number and activity in the global financial market.

2.3.6 Factors Influencing FinTech Adoption

Various studies have been conducted to investigate the factors influencing FinTech adoption, and the majority of these studies have been done using the TAM model. The TAM mode places emphasis on usefulness and easiness as a major determinant of adoption. Whereas the TAM provides a framework for understanding the variables that could affect FinTech adoption, the model has been significantly refined to include other important variables that apply to the FinTech phenomenon (Hu et al. 2019). This section examines some of these variables and their likelihood of influencing FinTech adoption.

Perceived usefulness (PU) has been extensively used as a factor affecting information technology adoption. Perceived usefulness describes the extent to which new information technology services enhance the work efficiency of a consumer (Davies, 1989). In the context of FinTech and for this study, perceived usefulness indicates the willingness of consumers to adopt FinTech services if they perceive that such services will have a positive impact on their activities (Rhu, 2018). Some studies on FinTech adoption (Ng and Kwok, 2017; Barakat and Hussainey, 2013; Hong and Zhu, 2006), for example, have used PU as one of their indicators and found that it has a positive effect on FinTech adoption.

Another variable from the TAM that is widely used to analyze the process of information technology adoption is perceived ease of use (PEOU). The PEOU describes

the degree of effort exerted in using the new technology (Davis, 1986). In the arena of FinTech, PEOU describes the ease with which FinTech services can be learnt and used. According to Chau and Ngai (2010), "the perceived ease of use has been an important determinant of FinTech adoption" since a better understanding of a concept influences interest in that concept. The variable, PEOU, has been used in FinTech studies to examine their influence on adoption. For instance, studies such as Akturan and Tezcan (2012) and Szopinski (2016) have found that "there is a significant relationship between perceived ease of use and FinTech adoption."

Another significant variable that has been described in the TAM and has been confirmed as an influencing variable in information technology adoption is the attitude and behavioural intentions of consumers. Consumer attitude refers to their judgment and personal opinion about a particular product or service. A consumer with a positive attitude toward a given product or service is likely to adopt it. Zhao et al. (2010) describe "behavioural intention" as the level of one's intentions to perform or undertake a given behaviour. From the studies that have applied TAM to examine information technology adoption, it has been discovered that the attitude and behavioural intentions of consumers affect their adoption intentions of FinTech services (Ng and Kwok, 2017; Gupta and Arora, 2017). Also, trust constitutes a significant factor affecting the adoption of FinTech. Hu et al. (2019) have observed that trust is very important in FinTech adoption because of the confidential data collected in the process of rendering FinTech services. In addition to these variables, other important variables such as security, demographic, and support factors have been identified as important variables affecting FinTech adoption (Abdinoor and Mbaba, 2017; Stewart and Jurjens, 2018). The current study contributes significantly to the

extant literature by focusing on Sub-Saharan African countries and the variables that influence FinTech adoption among consumers.

In addition to the above-mentioned factors assumed to influence FinTech adoption, demographic characteristics of financial consumers have also been identified as important determinants of FinTech adoption. EY's (2017) study has also revealed that younger individuals drive FinTech adoption in many jurisdictions across the globe. Using a global sample of people who are digitally active, the survey results indicate that over 48% of the FinTech users are between the ages of 25 and 34 years old. Those over the age of 75 years who are digitally active and use FinTech services constitute only 9%. Bech et al. (2018) have also observed that the use of FinTech services is higher in countries with a younger population compared to those with an older population. The authors further observed that the use of physical cash for transactions is common in countries with an older population.

Aside from the demand-side factors discussed above, there are other supply-side factors that are fueling FinTech adoption globally. One of these factors is the advancement of information and technology development, especially in sub-Saharan Africa. In recent years, various studies have shown a significant increase in the number of people who use mobile phones. According to GSMA (2021), in addition to the ownership of mobile phones, which facilitates access to fintech applications, there has been a significant improvement in internet infrastructure across the globe. In SSA, it is estimated that over 60 percent of adults have access to an internet connection, which makes it possible for them to access fintech services such as robo-advisors and peer-to-peer lending platforms, among

others. Thus, the increase in internet access has significantly spurred the development and adoption of FinTech services.

Furthermore, there has been a significant increase in the number of FinTech providers and platforms. In Sub-Saharan Africa, there has been an increase in start-up firms operating within the FinTech ecosystem. According to McKinsey (2022), in Africa, the number of startup firms tripled to 5,200 between 2020 and 2021, and out of this number, almost half were FinTech firms. There has also been significant penetration of fintech services. Average penetration levels of 3 to 4 percent in countries such as South Africa, Kenya, Ghana, and Nigeria. The increase in FinTech activities as a result of the injection of investment has had a significant influence on the adoption and use of these platforms by consumers.

The growth and adoption of FinTech services have also been spurred by competition within the sector. The fintech market is now dominated by both MNOs and fintech startups. In addition, some banks are also backing some fintech firms to improve their activities. The competition within the sector has not only increased the number of fintech products and services available to consumers but has also enhanced their adoption and use of these products. The high level of competition within the sector has helped reduce transaction costs and

The regulatory environment can also hinder or promote fintech adoption. In the extant literature, Rua (2018) has observed that nations with robust regulatory frameworks and the rule of law have higher adoption of alternative financial products, i.e., FinTech services, compared to those with less robust regulatory systems. In addition, Naveretti and

Colleagues (2017) have observed that countries with strict regulatory enforcement are less likely to witness high FinTech adoption compared to those with liberal regimes. Thus, countries interested in promoting FinTech adoption and improving the alternative finance ecosystem must enhance their regulatory environments.

2.3.7 FinTech and Individual Financial Behaviour

According to Tharkor (2020), financial technology is "rapidly developing digital financial services (DFS), providing citizens around the world–particularly the poor–with faster, cheaper, and more efficient tools to perform daily transactions, protect against emergencies, and invest in education, health, and businesses." A rapidly changing financial services market and an expanding number of new companies, including mobile operators (MNOs), technology providers, and FinTech startups, have characterized the FinTech evolution (AFI, 2020; Arner et al. 2015). The rapid rise of FinTech and the increase in FinTech services and providers has not only introduced a new set of financial products and services onto the market, but has also changed the financial behaviour of consumers (Evan and Pirchio, 2015). Financial behaviour such as savings, investment, consumption, and borrowing has been significantly impacted by FinTech adoption. According to Demerguc-Kunt and Klapper (2013), FinTech has altered and continues to alter the consumption and payment behaviours of consumers. Some studies have observed that mobile transfer and payment FinTech has the potential to increase savings and minimize consumption shocks among households. For instance, Demerguc-Kunt and Klapper (2013) have observed that FinTech affects the consumption, savings, and investment patterns of households. Mobile money accounts, for instance, can serve as a complement to the formal bank account and

encourage savings. The effort of governments to improve financial inclusion and encourage savings and investments can be made a reality through FinTech technologies. According to Evan and Pirchio (2015), mobile money and other FinTech technologies can serve as a useful savings mechanism for households without formal bank accounts and therefore contribute significantly to enhancing the financial inclusion agenda of governments. While in some countries, mobile money accounts do not pay interest, in others, like Ghana, mobile money users receive interest on their wallets. This serves as an incentive for people to save using their mobile money accounts.

In this study, we consider how FinTech can affect the savings behaviour of consumers. The focus on savings is important since it is one of the key financial behaviours of consumers that can enhance welfare. It is also one of the key financial decisions that must be made by individuals as far as their financial management is concerned. Household savings is very important since it can help them minimize any adverse shock associated with unforeseen exigencies (Hulme, More, & Barrientos, 2009). Specifically, the focus on SSA is very important because there are a significant number of vulnerable people who can face considerable negative shocks when they suffer ill health or there is a death in the family. Thus, the provision of the right savings technology is important in helping consumers save some of their income to deal with unforeseen life events (Christen and Mas, 2009).

2.3.8 FinTech and Bank Performance

The FinTech sector has witnessed significant growth over the past decade. This has tremendously affected traditional financial institutions, especially banks, leading to

significant alterations in the manner in which financial services and products are produced and delivered. It is, therefore, not surprising that questions have begun to emerge regarding the future of traditional financial institutions in the face of growing competition from FinTech firms. Over the years, it has become evidently clear that the traditional turf of banking firms is gradually being encroached upon by FinTech firms. These FinTech firms are not only offering services that are traditionally known to be performed by banks, but are also adopting attractive and innovative ways to attract a significant number of banking customers. Vives (2017) opines that despite the efforts made by banks to improve digitalization and compete favorably with FinTech firms, these FinTech firms continue to make inroads into the traditional business of banking firms. Several financial technology firms, often described as FinTechs, have sprung up in the past decade, offering banking services such as payments, funding, and money transfers, among others. Temelkov (2018) argues that FinTech firms providing non-banking financial products and services have encroached on the banking industry, which is already heavily competitive, giving the banks another competitor to worry about (Temelkov, 2018). According to CurrencyCloud (2016), FinTech firms must be a source of concern to the banking industry because these firms are known to deliver financial services at a relatively lower cost with an improved level of accessibility.

In the extant literature, various authors have examined how the FinTech ecosystem has affected existing financial institutions. According to Petralia et al. (2019), the evolution of FinTech innovation has had a significant impact on commercial banks. The authors specifically identify residential mortgages as the area where commercial banks have lost significant market share. Fuster et al. (2019) have opined that FinTech firms are taking

over the residential mortgage market because they process applications 20% faster than traditional banks. FinTech firms have also taken over some aspects of the financial intermediary roles known to be performed by commercial and other incumbent financial institutions. The innovative services offered by these FinTech firms are able to reduce costs and thus provide consumers with lower-cost financial services (Baker, 2015).

Given the stiff competition being offered by FinTech companies to traditional financial institutions, some studies have examined the extent to which FinTech innovation affects traditional financial institutions (see Phan et al., 2019; Hadad and Hornuf, 2018; Cumming and Schwienbacher, 2016; Navaretti, Calzolari, and Pozzolo, 2017; Vergas, 2008; Bank for International Settlement, 2008). According to Brandl and Hornuf (2017), FinTech firms are noted for introducing cheaper, faster, and more convenient financial services that are better than the cumbersome, costly, and old-fashioned services offered by some traditional financial institutions, and as a result, they are more likely to attract customers who have hitherto patronized the services of traditional banks. Phan et al. (2019) have observed that some activities of banks are now being ceded to FinTech firms and the substitution effect of FinTech is now being triggered. The Bank for International Settlement (2008) has also observed that FinTech can disrupt the financial intermediation roles known to be performed by banks and other finance-related institutions.

However, there are mixed views with regard to the effect of FinTech on traditional financial institutions. Whereas some authors assert that FinTech could have a substantial influence on the performance of FinTech firms, others posit that the impact is not significant. For instance, Vergas (2008) has observed that while banks have also introduced

technology into their operations to counter the impact of FinTech firms, their application of technology has been to a lesser extent compared to FinTech firms. However, Navaretti, Calzolari, and Pozzolo (2017) have observed that FinTech and banking are friends rather than foes, since they complement each other. Navaretti et al. (2017) explain that while FinTech promotes competition within the financial sector and provides the services offered by traditional financial institutions more efficiently, they are not likely to replace banks or significantly affect the performance of banks. The authors further argue that while banks may lose some of their margins to FinTech firms in the interim, in the long run, banks and FinTech firms will complement each other. Purnomo and Khalda (2019) investigated the influence of FinTech on financial institutions in Indonesia. Another area of interest for this research, among others, is to ascertain if the effect of FinTech on the banking sector of that country was positive or negative. Using descriptive analysis, the study observed that the evolution of FinTech innovation could hamper the growth and development of the banking sector if pragmatic steps are not taken. The result, however, indicated that if the right measures are put in place by traditional financial institutions, FinTech could be a source of opportunity for the banking sector of India. This is also in tandem with the findings of Temelkov (2018), who explained that traditional financial institutions can position themselves to adopt digitization to enhance their operations. The study underscored the need for the banking sector to embark on a digitization agenda if it intends to compete favourably with FinTech innovations.

According to Phan et al. (2020), FinTech has an adverse impact on both FinTech firms and banks as far as their performance is concerned, with the effect being higher for large banks. Small banks, according to some researchers, could respond more swiftly to

technological innovation than large banks, because large institutions often incur far higher restructuring costs due to legacy systems than smaller banks. Large companies, especially banks, are occasionally seen relying on current technology to reduce risk in their operations (Ajakaiye and O'Connell, 2011). Furthermore, according to Phan et al. (2020), the adverse influence of FinTech development on public banks is greater than on private banks. In comparison with privately owned banks, government-owned banks are more likely to dally in accepting and implementing innovations. The authors further opine that whereas privately-owned financial institutions are quick to embrace innovations within their operations, publicly-owned banks adopt slowly due to bureaucratic systems and financial constraints inherent in the public sector. According to Cull et al. (2017), public banks' competitiveness is affected by inefficient operations and poor intermediation quality.

From the studies examined above and the findings obtained from several empirical studies, it is quite clear that the debate as to whether FinTech could disrupt traditional financial services is far from over. Whereas there have been some suggestions that the growth of FinTech firms and their activities could affect the performance of banks, others have contrary views. Also, the extent to which FinTech firms affect the performance of banks and the financial system in general is less understood and will require empirical research to clarify (Phan et al. 2019). This research will seek, among other things, to determine if FinTech growth within SSA could affect the performance of traditional financial institutions.

2.3.9 FinTech Regulation

Regulation within the financial sector is key to the stability of the general economy. Since the financial sector is often described as the custodian of the wealth of households, businesses, and the government, a lack of effective regulation could have serious consequences for individuals, businesses, and the economy as a whole. Given the important role of the financial sector in the overall performance of the economy, it is not surprising that it happens to be highly regulated in every economy (Didenko, 2018). The goal of regulation in the financial sector is to protect financial customers, make it easier for people to get financial services, and keep the financial system safe (Didenko, 2018).

The regulatory regime of the financial sector is changing due to the emergence of innovative financial service delivery in recent years. Financial technology, which seeks to create innovative ways to provide financial services to customers, introduces new dynamics in the financial sector which require a different form of regulation. As indicated by Vikas et al. (2020), the advent of FinTech innovation has made it imperative for regulators and governments to design a comprehensive regulatory requirement to regulate the activities of these FinTech firms. The design of the regulatory framework is to ensure that the FinTech industry continues to operate optimally while at the same time ensuring that the sector contributes meaningfully to the growth of the financial sector without threatening the stability of the financial sector as a whole (Bhardwaj, Sinha, and Pal, 2019). Didenko (2018) defines regulation as formal rules designed by the government and other authorized institutions, either domestic or international, to control the way individuals and institutions behave. Thus, by extension, FinTech regulation is a body of rules made by regulatory institutions and government agencies designed to control the way FinTech

activities are undertaken within the economy. Since FinTech firms offer services that are different from those of traditional financial institutions, they may need a different set of rules than those used to regulate traditional financial institutions.

According to Didenko (2018), regulation within the FinTech sector is designed to achieve two important goals. The first is to enhance market competition and promote FinTech activities. The second goal is to keep the risk to financial consumers and overall financial stability to a bare minimum. For instance, regulators can create a friendly FinTech regime by introducing regulatory sandboxes and techniques that facilitate the development of FinTech activities. On the other hand, regulation is also intended to ensure that the inherent risks associated with FinTech products and services are minimized to protect FinTech users and ensure financial stability. For instance, the rise in FinTech activities could pose some threats to consumers in the form of cybersecurity. Also, some FinTech firms are likely to violate the privacy of consumers' data if left unregulated. Thus, while regulations within the FinTech sector are designed to encourage the provision of innovative financial products and services, they also provide the necessary safeguards to protect financial consumers and the financial system from abuse and fraud (AFI, 2018).

Magnuson (2018) also indicates that FinTech firms have unique characteristics that make regulation within the sector very important. First, the author indicates that FinTech firms are more vulnerable to shocks and other adverse economic effects than larger financial institutions. This is due to their size and the nature of their operations. Such shocks could spread to other firms within the financial sector and affect the financial stability of the economy. Second, since information about FinTech firms is relatively

scanty compared to traditional financial institutions, it may be difficult to monitor their activities and their operations within the financial system. Finally, Magnuson (2018) explains that there is a general lack of cooperation among FinTech firms and, therefore, members are mostly free from any internal industry regulation. The author believes that these factors call for decisive regulations to control the activities of FinTech firms.

2.3.9.1 Ways of regulating the FinTech Industry

Given the significant increase in FinTech activities in both developed and developing economies, efforts are being made to design policies and frameworks that regulate the activities of financial technology. Financial regulations, national legislation, and incentives are being used by countries to promote FinTech activities while also protecting consumers and the financial system. These may include consumer protection, privacy, and consumer protection, which is intended to safeguard consumers against fraud and cyber-attacks. Under financial regulations, FinTech legislation, regulatory sandboxes, and test and learn approaches have been developed. Also, to promote FinTech operations, which are critical to enhancing financial inclusion, governments and regulatory authorities provide funding assistance and tax incentives to support FinTech activities. Over the past few years, regulatory sandboxes and test-and-learn approaches have been the main policies adopted to regulate FinTech.

The use of regulatory sandboxes is intended to promote FinTech products and services while protecting consumers and ensuring financial stability. Regulatory sandboxes are designed to provide a testing space for participants to deliver their innovative financial offerings in a safe environment without having to cross all the existing regulatory hurdles

to engage in the activity in question (ASIC, 2018). Regulatory sandboxes have become one of the most widespread approaches aimed at regulating technology-oriented financial services. The purpose of setting up regulatory sandboxes is to provide an avenue for new financial technologies to be tested or experimented in a special regulatory framework (AFI, 2018). This modified or special-purpose framework is often described as a “regulatory sandbox”. It is a form of "safe" space provided for innovative financial services to be tested without necessarily meeting all the existing regulations. Whereas FinTech firms are permitted to test their innovations within a modified regulatory framework, they are required to provide the necessary safeguards to protect consumers and ensure that these innovations do not jeopardize overall financial stability. Thus, the purpose of regulatory sandboxes is to balance the quest for innovative financial products while ensuring financial stability and consumer protection. Sandboxes are seen as cost-effective measures aimed at supporting innovation within the economy. While sandboxes are seen as temporary regulatory measures, regulators may study the products and services offered while attempting to develop regulations that fit the particular FinTech product. The world’s first regulatory sandbox was launched by the financial conduct authority (FCA) in the UK. Since its establishment in 2015, hundreds of FinTech companies have signed on to the framework, which is aimed at supporting them in introducing their innovative products to the market. Once a FinTech company signs on to the sandbox, the FCA assigns resource people who work with the FinTech firm to understand the business model of the company and support it to conform to existing regulations where applicable. The resource person or case officer may seek the expertise of other officers when the need arises.

Even though the introduction of regulatory sandboxes has been accepted and adopted by some countries, many countries have also succeeded in promoting and regulating FinTech activities without the use of these sandboxes. Countries such as Kenya, the Philippines, and Tanzania have used another approach often described as "test and learn". With this approach, FinTech firms are allowed to introduce their innovative products without initial hindrance. Based on the test implementation, the regulators learn the business model and develop the necessary regulatory framework to ensure that the technology supports the financial inclusion drive of the country while ensuring that the necessary safeguards are put in place (Didenko, 2018).

2.3.9.2 Challenges of FinTech Regulation

As explained in the previous section, FinTech regulation is intended to achieve two main purposes. The first is to ensure the availability of innovative financial services that will enhance financial inclusion and promote economic growth. The second is to protect consumers and the financial system from the negative activities of some FinTech services (Didenko, 2018; Magnuson, 2018). There is, however, a challenge in developing a regulation that will attain an unbiased balance between these two conflicting objectives (Didenko, 2028). This is because any attempt aimed at promoting the first objective may compromise the ability to promote the second. Thus, to establish FinTech regulation, the macroeconomic goal of the economy must be considered. For instance, the regulators must assess the macroeconomic goals of the country and the level of financial inclusion. Where the economy has a large number of unbanked people, there is a likelihood that regulators may prioritize FinTech innovation over the protection of consumers and the financial

system. In the same way, where FinTech innovation and financial inclusion are not a priority, concerns about consumer protection and the stability of the financial system may be placed on the front burner as far as FinTech regulation is concerned. It is, therefore, clear that the objectives of FinTech regulation itself pose a huge challenge for regulators in terms of balancing FinTech innovation and the protection of consumers and the financial system.

Another major challenge connected with FinTech regulation has to do with the nature of FinTech technology itself (Knight, 2016). Since FinTech may cut across a variety of sectors, it will be extremely difficult to assign a single regulator to regulate FinTech activities. As a result, there is a high tendency to have multiple regulators overseeing the activities of a particular FinTech service or product. The result of having multiple regulators is the overlapping of responsibilities and inefficiencies. For instance, having the central bank and the communications ministry regulating the same FinTech activity is likely to create some form of regulatory conflict. For instance, in Ghana, mobile money payments are regulated by the Bank of Ghana, but issues relating to consumer privacy and interoperability are left to the communication ministry to handle. According to Knight (2016), such a situation may present opportunities for FinTech firms to seek regulatory arbitrage. Thus, the multiple and parallel regulations to deal with one FinTech firm can create regulation challenges (Knight, 2016). Also, another challenge of FinTech regulation is uncertainty regarding where the FinTech products fall within the existing regulatory framework. Since the majority of such innovations are novel, the existing regulatory framework may not be adequate to capture all existing and new FinTech products.

Another significant challenge that needs to be examined is the uncertainty with regard to where a new FinTech product falls within the current or existing regulatory framework. One of the main attributes of FinTech innovations is that they are constantly introducing new products and services that may be difficult to regulate using the existing laws and policies (ECB, 2012). Thus, there must be constant modification of the existing FinTech framework to control new and novel innovations. A typical example of this is the crowdfunding innovation on the African continent. Even though crowdfunding has been in existence for some time now, most of the crowdfunding innovations in Africa are donation-based. As a result, the introduction of debt-based crowdfunding innovations is difficult to regulate because it comes with its own set of opportunities and threats. This has led to a search for clarity regarding how debt-based crowdfunding innovation can be regulated (Bowmans, 2017).

The lack of international coordination has also been identified as a major challenge in regulating FinTech activities. Even though FinTech innovation and technologies are globally recognized and applied, there is a lack of coordination among regulators globally (Didenko, 2018). The same FinTech technology, such as debt-based crowdfunding, may be regulated differently across different jurisdictions. This lack of common regulation makes it challenging to apply all the different regulations to cover just one FinTech technology. Among the various FinTech products, one that has been approached or regulated differently across different jurisdictions is cryptocurrencies. The regulations applied in countries such as Australia, the UK, Russia, and Switzerland are different in various ways. The UK and Australia, for instance, classify cryptocurrency based on

domestic laws. Russia has detailed legislation that governs the application of cryptocurrency within its jurisdiction.

2.3.9.3 Trends in FinTech Regulation

Even though regulation of FinTech has become an essential focus in many countries, it must be emphasized that there is no universally accepted approach to regulating the technology. Each country and its regulatory organizations have their own techniques and mechanisms in place to ensure that FinTech innovation is promoted while also maintaining consumer and financial system protection. Regardless of the many ways employed to control these advances, earlier innovation and years of testing have resulted in internationally recognized trends that must be discussed now. Didenko (2018) recognized five important trends in FinTech regulation during the last few years. The first stage is to use various methodologies to achieve a better insight into FinTech innovation and its consequences for financial stability and consumers. This is frequently accomplished by forming a working group tasked with examining such technologies and recommending methods in which they can be effectively governed. Working groups dealing with FinTech products include the "distributed ledger technology working group" in the United States, the FCA in the United Kingdom, Russia's special working group on blockchain; and China's committee on financial technology. Second, after evaluating the initial service and communicating with the company, regulators may determine the scope of the regulation.

Furthermore, after figuring out the nature and format of FinTech innovations, regulators turn to international collaboration to comprehend the nature of such FinTech and how it has been regulated elsewhere. For instance, various countries, such as India,

Kenya, South Korea, and the UK, have entered into agreements to ensure that a common approach and best practices are factored into their FinTech regulatory framework. The fourth trend has been the establishment of FinTech hubs to expedite the promotion of FinTech development. Some of these innovations, or FinTech hubs, include the MAS FinTech Innovation Lab in Singapore, the FCA Innovation Hub in the UK, and the ASIC Innovation Hub in Australia.

Finally, international bodies are becoming involved in the regulation of FinTech development in all countries, including emerging, developing, and developed economies. Over the years, the international bodies that have been actively involved in FinTech include the IOSCO (the international organization of securities commissions), which has published some research reports on financial technology; the BCBS, which has released a series of papers to examine the impact of FinTech in the financial sector; the IMF, which has joined the FinTech impact debate; and the European Commission, which has established a FinTech task force to oversee FinTech innovation.

In summary, the 2008 financial crisis and its attendant problems within the financial sector have elicited rigorous regulation from governments all over the world with the goal of protecting consumers and the financial sector from future crises (CBinsights, 2019; Magnuson, 2018). Whereas strict regulations within the financial sector are viewed by many as the panacea to prevent future banking crises, these regulations may also hinder the growth of FinTech innovation (Brnovich, 2017; Yang and Li, 2018). To achieve a fair balance between these contrasting situations, policymakers will have to identify the right equilibrium between supporting financial innovation and FinTech on the one hand, and

ensuring consumer protection, financial stability, and financial integrity on the other. As the FinTech market gains momentum in Sub-Saharan Africa, issues about the proper and effective regulation of the sector have become very important. In view of the above, this study intends to investigate, inter alia, the nature of FinTech regulation within SSA and the best approach for regulating the FinTech market on the continent.

2.4 Empirical Literature Review

This section examines some empirical literature on the subject under investigation. The empirical studies are reviewed and presented under four thematic sections. These include empirical studies focusing on FinTech adoption, influence of FinTech adoption on consumer behaviour, the influence of FinTech on Bank performance, and the influence of FinTech on regulatory responses.

2.4.1 Empirical Studies on FinTech Adoption

A cursory review of the extant literature indicates that a substantial number of studies on FinTech have been carried out to examine the key determinants of FinTech adoption, and these studies provide valuable insights for the current study. Chuang, Liu, and Kao (2016) investigated the factors influencing customer acceptance of FinTech services based on the TAM model in China. The authors added service trust and brand to the list of behavioural elements that potentially influence FinTech adoption, in addition to the variables found in the TAM framework. The findings of the study identified that trust has a substantial impact on the uptake of FinTech services in China. The perceived benefit of a FinTech service was also recognized as having a direct and considerable impact on FinTech adoption. In a related study, Hu et al. (2019) also looked at the elements that

influence the adoption of FinTech technologies. The authors investigated bank users' intentions to adopt FinTech in China. The research was premised on the ETAM, which includes new factors in addition to those proposed by Davies (1986) in the original TAM model. Government support, risk, brand, and user innovativeness were all considered in the study.

In a related study, Stewart and Jurjens (2018) examined data security and consumer trust and how they affect FinTech innovation in Germany. The main focus of the research was to find and analyze the main elements that affect the adoption of FinTech in Germany from the perspective of businesses and individuals. The study relied on the technology acceptance model and a model developed by Wang et al. (2003) in designing the research. The authors considered factors such as data security, customer trust, and user design, among others, and how these variables support or restrict the adoption of FinTech. Using a structured questionnaire and structural equation modelling (SEM) techniques, the study observed that even though over 99 per cent of Germans use mobile phones, only 10% of the respondents who took part in the study revealed that they use FinTech services. The study underscored the need for FinTechs, incubators, and banks to persuade consumers to appreciate the benefits associated with FinTech services. The study's results also show that data security and customer trust are big factors in how well FinTech is used in Germany.

The result of the study by Stewart and Jurjens (2018) partially corroborates the findings by Meyliana, Fernando, and Surjandy (2018), who observed that customer trust is a significant antecedent of FinTech adoption. However, the results contradict the same findings made by the above authors, who discovered that risk and security are insignificant

determinants of FinTech adoption. The differences in the results of these studies provide further evidence for the need for more empirical research to be conducted, especially in developing countries, to examine the main factors affecting the acceptance of FinTech services. While the study by Stewart and Jurjens (2017) provides a comprehensive analysis and robust findings on the FinTech environment in Europe and the factors that promote or hinder its adoption, there are some gaps in that research that need to be identified. First, the study focused mainly on the implementation of FinTech in Germany and not the whole of Europe, raising issues about the generalizability of the findings. Since technology acceptance may vary from one environment to the next, comparing the findings in one country to two or more other countries would have provided interesting findings. Second, the study prioritized security, design, and trust factors that affect consumer adoption of FinTech products, with no effort to examine the social and demographic factors that could influence FinTech adoption.

Junger and Mietzner (2019) conducted a study in Germany to determine the main antecedents of FinTech acceptance in that jurisdiction. The purpose of the study was to appreciate the FinTech services that are most likely to be adopted by households and financial consumers. Using survey data, the findings of the study revealed that elements such as financial literacy, trust, comfort, and transparency are among the major factors affecting the adoption of FinTech services in Germany. They further revealed that perceptions about price substantially influence household acceptance of FinTech services.

In Korea, Ahn and June-Suh (2019) investigated the major concerns associated with FinTech innovation in that country. While acknowledging the importance of FinTech in

reducing fraud, improving consumer experience, and streamlining the payment process, the authors investigated some of the concerns that impede FinTech adoption. The study observed that the major concerns that affect the adoption and usage of FinTech services include security of consumers' money, protection of their investment, lack of expertise on the part of FinTech firms, protection of consumer data, privacy concerns, as well as cyber-attacks from hackers and crackers. Thus, the need for an effective and efficient regulatory framework was recommended as one of the means of ensuring consumers that they are protected from any form of abuse.

Mu and Lee (2017) also compared the factors driving the acceptance and use of FinTech services in China and South Korea. They sought to determine if the factors that affect the adoption of payment FinTech in China differ significantly from those in Korea. The study relied on the UTAUT model. Using analytical techniques such as TOPSIS and AHP, their findings revealed that while price is the most significant element affecting the adoption of FinTech products among Chinese consumers, perceived credibility was found to be the most important factor considered by Korean consumers.

In South Korea, Kim et al. (2016) studied the main determinants of FinTech payment platforms using the TAM. The study observed that the credibility of the payment platform, the usefulness FinTech platforms, and the ease with which the payment platform can be assessed and used are some of the major significant elements affecting the acceptance of payment FinTech in Korea. The study also found that the self-efficacy of the consumers significantly moderated "the relationship between the dependent and independent variables". In Bangladesh, Siddik et al. (2014) also examine the behavioural

factors affecting the adoption of mobile banking in that country. The study relied on the innovation diffusion theory with other variables such as perceived financial cost. The study observed that perceived financial cost is the most important factor affecting adoption.

Haddad and Hornuf (2016) also investigated the socio-economic and technological elements that influence the decisions of entrepreneurs within the FinTech space to start a FinTech service. The study observed that the availability of the latest technology is an important factor that influences the setting of FinTech services. They observe that when technology is available and consumers have access to the electronic gadgets that facilitate the adoption of FinTech services, it encourages FinTech activities. The study also observed that countries with a strong and sound financial system have a lower number of FinTech startups. The study finally observed that for FinTech services to thrive, there must be policies and regulations that support their activities.

Ryu (2018) also assessed the elements that may promote or inhibit the adoption of FinTech services in India. Thus, the study focused on the possible enablers and threats that are likely to influence FinTech adoption. The result of the study found that risk negatively influences the adoption of FinTech services. It was further observed that risk factors are more likely to influence the adoption of FinTech than perceived benefit factors. Convenience was also found to be a positive enabler of FinTech acceptance.

The study by D'Acunto et al. (2019) also focuses on the adoption of robo-advisors by household investors in India. The study's results point out that the use of robo-advisors by investors helps improve their portfolio diversification. Also, the findings show that adopters of robo-advisors are more active in the financial markets compared to their

counterparts who are not. With regards to lending and borrowing, Agarwal et al. (2020) investigated the role of FinTech in lending and borrowing among Indian households. The study observed that the use of technology is very effective in identifying the social and economic footprints that are crucial to minimizing default prediction.

While FinTech has the potential to improve the socio-economic development of people all over the world, its adoption is influenced by several factors. In an attempt to examine these factors, Meyliana et al. (2018) investigated how risk and trust affect the acceptance of FinTech products in Indonesia. The study aimed at examining the extent to which perception of risk and trust hinder the acceptance of FinTech services using the technology acceptance model, which has gained widespread adoption as far as technology adoption studies are concerned. A quantitative technique in the form of SEM was applied to examine the effects of perceived trust and risk on FinTech adoption. The study revealed that trust significantly affect the adoption of FinTech products in Indonesia. It must be noted that while this study contributes to the understanding of the factors influencing the adoption of FinTech services, it is limited to only Indonesian consumers. As a result, it will be difficult to generalize such findings to cover a wider population. Again, the study focused mainly on perceived risk and trust of individuals and how these factors affect FinTech adoption.

In Indonesia, Iman (2018) also examined the dynamics of financial technology in the country by examining its importance to the socio-economic needs of the people. The study was designed to help researchers and people within academia who seek a broader understanding of the FinTech phenomenon in their country and beyond. The data applied

includes secondary sources and interview guides. Using descriptive and exploratory analysis, the study revealed that FinTech is more than a phenomenon and that it has the potential to transform the economic landscape of nations if it is properly embraced and adopted. The study further observed that, unlike in some jurisdictions where FinTech firms are spearheaded chiefly by innovators and students, in Indonesia, the FinTech business is initiated and sustained by experienced business people who understand the business landscape. While the study by Iman (2018) provides some insight into the concept of FinTech and provides some reference material for researchers and students, the study focuses mainly on Indonesia without comparing what happens in that country with the rest of the world.

Jiwasiddi et al. (2019) examined how trust, easiness of the application, and usefulness of FinTech affect adoption among Millennials in Indonesia. Using structured questionnaires and applying the structural equation modelling technique, the study found that trust, ease of use, and benefits factors are important determinants of FinTech adoption among millennials in Indonesia.

In a study conducted by Schaner (2017), it was found that the acceptance of ATM cards, which is an important technology within the financial space, has a significant positive impact on accounts held by men, compared to their female counterparts. This result implies that men are more likely to benefit from the use of FinTech technology compared to their female counterparts. The benefit of mobile money innovation in Tanzania was also examined by Economides and Jezioski (2017). Using data from natural experiments, the authors observed that the majority of Tanzanian financial consumers are likely to adopt

mobile money innovation because of the convenience and reduced risk associated with the use of mobile money wallets. For example, the study showed that people are willing to pay up to 1.25 percent in transaction fees to keep their money in a mobile money account instead of at home.

Soutter, Ferguson, and Neubert (2019) investigated the factors that are significant determinants of digital payments in SSA. The focus of the study adds to the literature and contributes to closing the gap in the literature as far as FinTech mobile money payments and transfers are concerned. The study focused on three SSA countries, which included South Africa, Nigeria, and Kenya. Using information from various sources, the high number of consumers coupled with the development of technological infrastructure are the major driving forces for FinTech adoption. The study is relevant in three different ways. First, it provides a framework for understanding FinTech adoption in SSA. However, the major drawback of this study is that it proposed the framework without empirically testing it. The proposed framework was not tested or validated using quantitative techniques. Furthermore, the elements affecting the acceptance of mobile payment and transfer FinTech in individual African markets may differ as a result of the significant diversity within Africa.

In Togo, Gbongli, Xu, and Amekjonekou (2019) examined the adoption of mobile-money services in that country. The authors noted that even though mobile money technology has been massively accepted by individuals in Togo, the factors that affect its sustainable acceptance have not been explored. The authors extended the original TAM to include other indicators such as personal innovativeness, self-efficacy, and anxiety as part

of explaining the sustainable adoption of mobile money technology. Using SEM and artificial neural networks (ANN), the author indicates that "ease of use is the most significant determinant of the adoption of mobile money technology services in Togo." The result, however, revealed that "perceived usefulness has an insignificant impact on mobile money technology adoption". The strength of this study is that it fills the research gap as far as adoption intentions of mobile money in SSA are concerned. It also applies different statistical tools to provide a robust result. However, like other studies, this one did not include moderating variables such as experience and other demographic factors such as gender and age.

2.4.2 Empirical Studies on Fintech Regulation

Cumming, Johan, and Pant (2019) examined the regulation of cryptocurrencies by focusing on how to manage the challenges and regulatory uncertainties associated with their adoption. The authors acknowledged the significant strides being made by blockchain and distributed ledger technologies in the global arena. The study observed that the existing regulatory framework in Switzerland is not adequate to deal with the cryptocurrency risk in the country. The authors, therefore, underscored the need to have a special regulatory vehicle to manage crypto assets.

In Indonesia, Fernando, Suryanto, Srjandy, and Meyliana (2019) investigated the elements that affect the behaviour of consumers with regards to FinTech adoption. Applying the TAM model, the authors observed that perceived ease of use, trust, and usefulness factors significantly affect the adoption of FinTech services. The study, however, found that risk is not a major influencing factor when it comes to FinTech

adoption in Indonesia. The study by Fernando et al. (2019) clearly shows that trust is a major influencing factor for FinTech adoption. This result is in agreement with studies such as Stewart and Jurjens (2018) and Didenko (2018). This study, however, finds risk as an insignificant element that affects the acceptance of FinTech services. The major strength of the study by Fernando et al. (2019) is that it uses two major quantitative techniques to examine the influencing factors. While the structural equation modelling (SEM) technique provides researchers with the opportunity to identify the main factors that affect FinTech adoption, the TOPSIS technique enables the authors to rank the importance of the factors in order to determine the most influential ones. However, the study had a few gaps that needed to be identified. The study focuses mainly on the perceived risk and perceived benefits without focusing on the social factors that could affect FinTech adoption. Also, demographic factors were not included as part of the potential factors that could affect the adoption of FinTech services.

Didenko (2018) focused on the regulation of FinTech and the possible challenges associated with it. The author acknowledged that the rise of FinTech in sub-Saharan Africa poses some opportunities and threats that need to be examined. The study, therefore, focused on Kenya and South Africa, which are the leading countries in FinTech hubs in Africa, and examined their regulatory frameworks. The author also examined these regulations within the broader global framework since it is difficult to limit regulations to one or two countries. The study began by clarifying various terminologies associated with FinTech regulation and the various challenges associated with the same. The comprehensive review of the literature by the author revealed that the rule of law issues are the major challenges associated with regulation within the SSA rather than technical

problems. Also, after discussing the various regulatory issues in the two SSA countries, the findings of the research concluded that there is no uniform framework regulating the various FinTech within the sub-region. The study further observed that the definition of "FinTech" is a major challenge in designing the right regulatory framework to deal with FinTech-related products and services. The study, therefore, concluded that the development of the right regulatory framework cannot be achieved without a proper definition of the concept. The comprehensive examination of the various FinTech products and services in these two countries revealed that South Africa and Kenya don't have a comprehensive legal and regulatory framework designed to deal with FinTech-specific issues. However, the issues, as they emerge, are examined and regulated in such a way that the interests of FinTech firms, consumers, and the financial system are protected. Didenko (2018) notes that such an ad-hoc approach sometimes encounters some problems associated with fast-paced technological development. This has led to the development of a regulatory sandbox as a means of dealing with fast-pace FinTech innovation in Kenya, specifically. While the study by Didendo (2018) appears to be one of the most comprehensive analyses of FinTech regulation in SSA, the study mainly focused on the top FinTech countries in SSA, which comprises Kenya and South Africa.

2.4.3 Empirical Literature on FinTech and Consumer Financial Behaviour

Again, the study by Becker (2017) in Germany investigated the extent to which household savings are affected by FinTech. The author specifically focused on money management and FinTech and how they affect the savings behaviour of households. Using secondary consumer data of over 65,000 customers, the result shows that the activation of money management FinTech services by individuals increases their likelihood of saving.

However, the study observed that the financial literacy level of consumers could serve as a hindrance to their adoption of money management FinTech services. Overall, the study observed that FinTech can serve as an important platform in promoting savings among financial consumers.

FinTech innovation has not only improved payments and money transfers, but has also improved lending and borrowing. For instance, in a study by Fuster et al. (2019) in the US, the authors observed that FinTech can be effective in enhancing financial and refinancing decisions by consumers. Using data from the mortgage market, the authors found that the use of financial technology is able to minimize friction in the mortgage market. Also, the time taken to process mortgage loans is reduced significantly.

In a similar research by Buchak et al. (2018) in the US, the authors found that FinTech lending is cheaper and more convenient compared to traditional lending. The authors believe this favours prospective consumers who will not be able to meet the stringent requests of traditional banks for accessing loan facilities. Aside from the convenience and lower cost of borrowing, Bartlett et al. (2019) have also observed that the use of FinTech lending can minimize face-to-face discrimination. Using data from the US mortgage market, the authors disclosed that with the help of the credit scoring algorithm that benefits minority borrowers, FinTech lending is able to increase access to loan facilities for minority groups in a manner that cannot be done. For instance, the authors opined that African-American and Latino applicants are most likely to benefit from FinTech loans.

Another important aspect of FinTech innovation that continues to receive attention from researchers is the use of technology to support investors and financial consumers to receive useful financial advice. This is often described as "robo-advisors." Evidence has been found to the effect that robo-advisors have significantly improved and reshaped the financial assets of investors. For instance, Rossi and Utkus, (2019) observed that in the US, the acceptance of robo-advisors by households has resulted in an increase in the stock holdings of investors by almost 20%. The study further revealed that there has been a decrease in the cash holdings of households from 22 percent to 1 percent. Other results of the study found that individual investors who are less experienced in the investment arena are the main beneficiaries of robo-advisors, helping them to improve their financial literacy skills in the process. It must be noted, however, that despite the numerous benefits associated with the adoption of robo-advisors by households, Jung et al. (2017) have observed that the overall adoption of robo-advisors by US citizens is lower than expected. This, the author asserts, could be due to a lack of understanding of the Robo-advisors FinTech model. Another possible reason for this phenomenon, according to the authors, is the unwillingness of many to participate in investment activities.

Crowd-funding is also another important aspect of FinTech that has piqued the interest of researchers in recent years. Whereas Mollick (2012) has observed that there are significant risks associated with the crowd-funding platform, other studies have espoused the benefits of crowd funding to investors and businesses. For instance, Agrawal et al. (2015) observed that “the use of crowd-funding can minimize distance-related frictions” by improving information gathering and progress monitoring. Other studies have also observed that crowd-funding helps investors protect their privacy. The ability of crowd-

funding platforms to hide the identities of investors makes it a conducive investment environment for investors who are concerned about privacy matters. For example, Burtch et al. (2015) used statistical techniques to examine how the issue of privacy affects the amount of contribution by investors. The study found that investors usually cut back on how much money they put in to avoid getting too much attention when their privacy is not protected.

Mobile money payment and transfer innovation is the main FinTech model that has gained widespread acceptance in Sub-Saharan Africa. Thus, the majority of studies carried out in the region have focused on mobile money FinTech with an emphasis on adoption, benefits, and challenges. For instance, in a study conducted by Suri and Jack (2016) in Kenya, it was observed that the mobile money platform, called M-PESA, has reduced poverty levels among Kenyans by 2%. The effect of FinTech innovation on gender has also been examined in the extant literature.

In Burkina Faso, Ky., Rugemintwari and Sauviat (2017) examined the extent to which mobile money technology can encourage households to build savings to meet unforeseen emergencies. Primary data was collected from selected mobile FinTech users in that country. The result of the study shows that the use of mobile FinTech increases one's propensity to engage in savings for unpredictable future events. The study further found that disadvantaged groups, such as women, rural illiterates, and individuals with low incomes, take advantage of mobile money technology to save for the future. The study concluded by recommending that the authorities in that country and elsewhere initiate

policies aimed at encouraging mobile technology since it enhances financial inclusion and promotes savings among households.

2.4.4 Empirical Studies on FinTech and Bank Performance

In Indonesia, Phan, Nayaran, Rahman, and Hutabarat (2019) also examined the extent to which FinTech services affect the performance of traditional banks. The researchers tested the hypothesis and sought to find out whether the growth in FinTech has any influence on the performance of banks. Their findings show that growth in FinTech negatively affects bank performance. Using bank performance measures such as ROE, ROA, and NIM, the result shows that these bank performance measures are negatively affected by the growth in FinTech. The study particularly found that bigger banks are more affected by FinTech than smaller, younger, and privately owned banks. The study by Phan et al. (2019) is robust in the sense that it uses multiple bank performance measures. Also, different estimators are applied to arrive at the result of the study. Finally, multiple control variables are used in addition to the independent variables.

Siek and Sutanto (2019) also investigated the influence of FinTech development on the traditional banking industry. The paper used quantitative techniques such as regression and correlation analysis. Variables such as customer satisfaction, net promotion score, and ease of use, among others, were used to estimate the regression equation. The result of the study reveals that, as a result of the superior value proposition offered by FinTech services, banks have been negatively affected by the evolution of FinTech firms. The authors further observed that the customer-centric approach adopted by FinTech firms and the high customer satisfaction strategies offered by these firms make them attractive to customers.

Paulsen and Yildirim (2018) also investigated the impact of mobile money on the savings and borrowing behaviour of customers in China. The study applied pooled cross-sectional data obtained from the "global financial inclusion index," which is published by the World Bank, Data was collected from 2011 to 2014. Using logistics regression techniques, the study observed that FinTech services, proxied by mobile money usage, have a significant positive effect on savings and borrowing among Chinese consumers. Put differently, individuals were found to be more likely to save or borrow when they were hooked onto mobile money FinTech platforms. The study further observed that mobile money FinTech appears to be more useful for low-income individuals than worthier ones.

In Ghana, the Bank of Ghana (BOG) (2017) empirically investigated the effect of mobile money technology on the payment system of Ghana. Using econometric models, the study observed that a strong relationship exists between the development of the mobile money sector and Ghana's payment system. The study observes that the improvement in the mobile money sector improves the development of the payment system, improves financial deepening, and enhances the cash-lite economy. The study further observed that all the factors that promote mobile money adoption and usage are also likely to improve the financial system, depending on a cash-lite economy. Given the findings, the study recommends that much needs to be done to improve financial technology, especially those within the mobile money payment sector.

The GSMA (2019) investigated the impact of financial technology and mobile money on the monetary and financial stability of countries within Sub-Saharan Africa. The authors of the research explained that even though a plethora of studies have focused on

the influence of mobile money technology on businesses and individuals, its impact on the economy has not been adequately explored, hence the motivation for the study. To make a contribution to filling the research gap, the study assessed the effect of mobile money technology across several SSA countries. The result of the study found that mobile money technology improves the monetary system by effectively transferring money into the financial system, thereby enhancing financial depth. Also, they observed that the increase in mobile money transactions enhances the growth of the traditional banking sector. Again, the study found that the growth in mobile money technology improves economic activities and promotes spending and savings, which are important for socio-economic development. The study also found no evidence to suggest that mobile money technology poses any risk to the financial stability and payment systems in SSA.

2.5. Gaps in the Literature

The comprehensive review of the literature helped the researcher identify some gaps in the existing literature that need to be highlighted. First, whereas it is an undeniable fact that a plethora of studies have been conducted to ascertain the main factors affecting the acceptance of FinTech services in developed, emerging, and developing economies, the results have been mixed. For instance, while some studies have discovered that risk factors are important determinants of FinTech adoption (see Stewart and Jurgens 2018; Rhu, 2018; Meyliana et al. 2018), others have found risk factors to be insignificant determinants of FinTech adoption (see Kim et al. 2016; Fernando, Surayanto et al. 2019). The lack of consensus regarding the key factors that affect FinTech adoption and the mixed results produced over the years require further empirical investigations. Furthermore, while SSA remains the global epicenter of mobile money and other FinTech services, there is a

wide degree of cross-country variation in terms of adoption and the factors that influence it. A cursory review of the extant literature indicates that most of the studies conducted in SSA have focused on single-country analysis, with little focus on cross-country investigation of the factors affecting FinTech adoption.

Second, the use of technology to facilitate financial transactions (FinTech) is growing steadily. With the growing acceptance of FinTech services, there will be both opportunities and risks to financial stability, which will require the attention of policymakers, regulators, supervisors, and overseers within the financial space. Whereas developing countries such as the UK, US, Germany, and Russia have developed comprehensive regulatory sandboxes and policies to regulate the activities of FinTechs, issues related to the regulation of FinTechs have been relegated to the backburner as far as SSA is concerned. Also, while many studies on FinTech have focused on challenges, benefits, and adoption of FinTech services, research on FinTech regulation has been scarce. Questions about how governments and central banks in SSA are responding to FinTech innovation have not received adequate attention from the extant literature. This study, as part of its objectives, seeks to contribute to bridging this gap.

Again, a careful examination of existing empirical literature indicates that despite various attempts to examine the FinTech phenomenon for the past five years, there are untouched areas that need to be examined. A thorough review of the literature revealed that customer attitude and how it affects FinTech adoption has not been extensively explored in SSA. This observation is supported by Kavuri and Milne (2019), who have observed that issues relating to customer attitudes towards FinTech services have not been widely

studied, especially in developing economies. Also, a cursory view of the existing studies indicates that there is no comprehensive research in SSA to compare FinTech adoption among countries in SSA. The majority of the existing studies on FinTech in SSA have focused on single country case studies instead of multiple country analysis. As a result, it is difficult to know whether the factors that affect FinTech adoption vary significantly among countries within the SSA. However, developing economies are significantly more difficult to navigate. Customers in these economies have very different experiences when it comes to obtaining financial services, and these differences must be addressed if FinTech is to succeed in new markets (Buckley and Webster, 2016).

In SSA, mobile money FinTech has significantly penetrated the landscape of the financial sector. However, besides anecdotal evidence, not much is known about the effect of FinTech innovation on the performance of banks (Kavuri and Milne, 2019). Inadequate literature on the extent to which FinTech is impacting the performance of the banking sector is a clear testament to the lack of interest in that area. The review of the literature clearly demonstrates that the impact of FinTech on the performance of banks has not been adequately explored in developing markets. The review of the literature also uncovered that research on FinTech in sub-Saharan Africa has focused primarily on the evolution of FinTech and its benefits on the African continent. However, studies examining the impact of FinTech on existing financial institutions such as banks or credit unions are scarce. Against this backdrop, the current study investigates how the advent of FinTech innovation is influencing the financial wellbeing of traditional banks in SSA.

Again, whereas the use of the TAM has been extensively used to ascertain the adoption of FinTech products among consumers, the theory was developed in the United States, where the culture and behavioural intentions of the people are different from those in developing economies. As observed by McCoy et al. (2017), the TAM, which originated in the United States, may not be applicable universally since the attitude of different cultures towards technology use may differ. This study attempts to develop a model for measuring the FinTech adoption intentions of consumers in SSA that will fit the cultural, social, and attitudinal backgrounds of the people.

2.6 Summary of Literature Review

In chapter four, the literature supporting the research was comprehensively reviewed and presented. The literature was obtained using databases such as Science Direct, Elsevier, Google Scholar, and other peer-reviewed journals. In addition, other relevant documents, such as company records and periodicals, were obtained and reviewed using internet sources. The literature review was carried out under three main thematic areas. These include theoretical, conceptual, and empirical literature reviews. For the purposes of the study, a number of theories were considered. These include the TAM, TRA, ANT, Consumer Theory, the DIT, and the UTAUT. All of these theories were thought to be important for the current research because they helped explain how people use FinTech and how it affects consumers, banks, and how regulators respond.

A number of important terms and concepts were also reviewed in this chapter with the view of understanding the key variables and the relationship existing between them. Specifically, the researcher investigated the concept of FinTech and the factors influencing

its adoption and usage. Second, the drivers of FinTech growth were also reviewed to appreciate the main antecedents of FinTech development. The role of FinTech in influencing individual financial behaviours such as savings, borrowing, and investment was also outlined under this chapter. Furthermore, the relationship between FinTech growth and bank performance was also investigated. Again, FinTech regulation in the wake of FinTech growth was also reviewed and presented.

Several empirical studies were also reviewed. We examined studies from developed, developing, emerging, and SSA economies to know what is being done across jurisdictions. There is no doubt that the review of literature has improved the researcher's understanding of the topic and revealed important variables that have been useful for the current study. The literature review has not only improved the researcher's understanding but has also helped to clarify concepts that were previously considered ambiguous and difficult.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Research involves the use of scientific methods and procedures to gather relevant information with the aim of expanding knowledge in a given field of study. Research is often described as a process because it follows laid-down steps, procedures, and methods to arrive at a conclusion. All the relevant steps required to begin and successfully complete a piece of research are often described as the research process (Saunders et al. 2018). The authors have further opined that the research process is "a multi-stage process that must be followed in order to begin and finish a research project successfully." There are several steps to the procedure, which vary depending on the research topic and field of study. However, almost all academic research follows some important steps or stages. Saunders et al. (2009, p.10) further indicate that "the precise number of stages varies, but they usually include formulating and clarifying a topic, reviewing the literature, designing the research, collecting data, analyzing data, and writing up."

The first two chapters of this thesis have formulated and clarified the topic, reviewed relevant literature, and identified gaps in the literature that need to be filled. This chapter is structured to give clarification on the methods, procedures, and techniques for collecting, evaluating, and presenting relevant data.

The purpose of research methodologies is to create a clear path for data collection and analysis (Saunders et al. 2018). According to Kallet (2004), the research methodology section of a scientific study is to help provide answers to two key questions: how data is

generated or collected and how data is analyzed and presented. Research methods have a number of benefits when well-articulated. It provides a comprehensive description of the actions taken to address the research problem. The research methods also attempt to justify the application of a particular procedure or techniques in identifying, processing, and analyzing available information. By providing the relevant steps and techniques, the reader is able to assess how valid and reliable the study is**.** The research methodology further demonstrates to the reader how data was gathered and the extent to which the procedure used consisted of best practices in that particular field of study. The research methods section also provides a description of specific methods adopted in collecting data. For instance, the use of questionnaires, interviews, surveys, archival data, and observation is clearly articulated at this stage. In addition to the data collection procedure, the methods section also describes and provides justification for the sampling procedure adopted. For instance, a researcher who intends to use questionnaires to collect data must be in a position to describe and provide justification for the population and the sample chosen. The reason for the selection of particular data should also be explained at this stage.

This chapter is designed to provide a detailed procedure for collecting, analyzing, and presenting the relevant data of the study. The chapter is presented under seven main sections. Section 3.2 provides a comprehensive assessment of the research design and approach adopted for the study. Section 3.3 describes the population and the sampling procedure adopted to recruit respondents for the study. In section 3.4, the materials and instruments used to gather primary data are presented. Section 3.5 provides the operational definition of the study variables for the quantitative part of the study. Section 3.6 provides a detailed explanation of the procedure adopted for gathering data from respondents. It also

outlines the steps taken to ensure that ethical considerations and standards are observed. In Section 3.7, the procedure for data collection and analysis is presented. Specifically, the quantitative data analysis techniques as well as the qualitative data analysis techniques applied in this study were specified.

3.2 Research Design and Approach

3.2.1 Philosophical Stance

Research is mostly guided by some basic beliefs and assumptions, and these beliefs and assumptions are often described as paradigms or research philosophies (Rocco et al. 2003). In many instances, researchers approach their research with their own worldviews and philosophical standpoints. In view of this, Creswell (2014) proposes that a research design process must first begin with the research paradigm and philosophy since these philosophies or paradigms determine how the research is conducted. Saunders et al. (2012ided by some basic beliefs and assumptions, and these beliefs and assumptions are often described as paradigms or research philosophies (Rocco et al. 2003). In many instances, researchers approach their research with their own worldviews and philosophical standpoints. In view of this, Creswell (2014) proposes that a research design process must first begin with the research paradigm and philosophy since these philosophies or paradigms determine how the research is conducted. Saunders et al. (2012) stated that "a research paradigm or philosophy is concerned with *the development of knowledge and the nature of knowledge."* It is also described by Bryman (2008) as the set of assumptions and beliefs that informs the right knowledge to produce, how it should be produced, and how such knowledge should be interpreted.

In the process of developing knowledge, different assumptions and approaches are used. The research philosophy adopted by a researcher provides some critical assumptions regarding the way he or she perceives the world. The assumptions and philosophies go a long way towards determining the design and strategy employed by the researcher as well as the methods chosen. As a piece of research can be approached from different perspectives, the perspective or approach applied hinges on the research philosophy or paradigm of the researcher. Hitchcock and Hughes (1995, p.21) also posit that "*the ontological assumptions of the researcher give rise to his epistemological assumptions, which in turn give rise to methodological considerations." The methodological assumptions further dictate the nature of instrumentation and data collection methods*. Thus, the philosophical stance of the researcher influences the research design and approach adopted to deal with the research problem. Some authors believe that understanding research philosophies is important in management research because it influences not only how the research is conducted but also how the researcher understands and interprets the phenomenon under investigation (Collis and Hussey, 2003; Johnson and Clarke, 2010).

Bryman and Bell (2012) argue that ontological assumptions relate to how one perceives social entities. The two major ontological assumptions are realism and constructionism. Whereas the proponents of realism posit that social entities or phenomena must be perceived as objective and independent from the social actor, the proponents of constructionism see social phenomena or entities as "constructed" and thus derived from the opinions and actions of social participants. The ontological position adopted by a researcher also influences his epistemological stance, which is concerned with the best way

of acquiring and validating knowledge (Bryman and Bell, 2012). Saunders et al. (2012), p. 112, also describe epistemology as "what constitutes acceptable knowledge in a given field of study". Whereas there are various ways and means of producing knowledge in a given field of study, epistemology seeks to explain the most suitable approach for producing such knowledge. Generally, there are two main epistemological positions: positivism and interpretivism. The positivism philosophy sees the social world and social phenomena as objective and, therefore, scientific methods can be applied to investigate social actors and their behaviour (Saunders et al. 2019). Thus, positivist philosophy focuses on measurable quantitative data to establish relationships between variables. It also assumes that the concept being investigated by the researcher is independent of the investigator, and therefore the researcher has no influence on such a phenomenon. Positivists usually employ structured and large samples of data that can be analyzed quantitatively to establish causal relationships. On the other hand, the interpretivism/phenomenology philosophy is predicated on the assumption that the social world can be best understood if behaviour and social actors are comprehensively examined rather than quantified. The intepretivism philosophy further opines that to obtain rich and in-depth information about social actors, the use of objective techniques to quantify and explain behaviour will not yield any positive outcome. Advocates of interpretivism, on the other hand, use a small sample size and interviews to find out more about the participants and their experiences.

Over the years, the debate as to which of the two epistemological positions mentioned above is superior has led to the so-called paradigm war. This "war" has been somehow resolved by a third epistemological position, which seeks to combine both positivism and interpretivism paradigms in a single study (Johnson, Onwuegbuzie, &

Turner 2007). This paradigm seeks to combine the strengths of both positivism and interpretivism. This philosophical position suggests that the nature of the research problem and questions should be the yardstick for determining the best epistemological position to adopt.

The current study takes a middle position between the extremes of realism and constructionism on the one hand, and positivism and interpretivism or phenomenology on the other. In other words, the pragmatist approach is considered for the purposes of this study. The pragmatism position posits that the most important metric to determine the best epistemological and ontological position to be adopted by a researcher is the research questions (Saunders et al. 2019). Thus, the nature of the research problem and questions determines the most appropriate philosophical position that will be appropriate in answering such research questions. The current study has the main theme of examining the impact of FinTech on key actors within the financial sphere. In doing so, the use of objective measures makes the study tilt towards an objective or realist orientation. However, the researcher further recognizes that the views, opinions, and experiences of the key actors within the FinTech ecosystem are relevant for understanding the FinTech ecosystem. The in-depth views, opinions, and suggestions of regulatory experts and bank staff will be helpful in obtaining relevant information about the subjects which cannot be ordinarily obtained through the use of the positivist approach alone.

Epistemologically, the study tilts towards the mixed method or pragmatist paradigm. Whereas the positivist position will help the researcher conduct tests to establish knowledge through cause-and-effect relationships, the interpretivist or phenomenologist

position will be relevant in comprehensively understanding the viewpoints of key actors within the FinTech ecosystem within SSA. In this current research, the first three questions are designed in such a way that the positivist philosophy will be more appropriate in answering them. The development of hypotheses for these research questions and the quantitative data gathered with the aid of structured questionnaires makes the use of positivist assumptions the ideal philosophical position to adopt. On the other hand, research question four of this research will be best answered if the interpretivist philosophical assumptions are adopted. This is because the research question wants to look into how FinTech is regulated in the SSA. Using interviews will help the researcher get the deep understanding of the phenomenon that is needed.

3.2.2 Research Approach and Design

Choosing the right and appropriate research design is crucial to ensuring the validity of the research outcome. Research design provides a broad roadmap regarding how data will be collected and analyzed to meet set objectives (Grey, 2014). According to Creswell, Plano, and Clark (2007, p. 58), "research design is concerned with the procedures that lead to the collection, analysis, interpretation, and reporting of research findings." A research design is very important in any research since it determines the research strategy to be embraced, the data collection methods, and the data analysis procedure. It also informs the time horizon within which the research work is undertaken (Saunders et al. 2012). Put differently, the research design is a general plan that comprehensively explains how the research questions are answered. Research design is also defined as the plan that focuses on the processes involved in gathering and analyzing research data. Zikmund et al. (2019) also define a research design as "a master plan that specifies the methods and

procedures for collecting and analyzing the needed information." According to Saunders et al. (2019), a research design can take the form of a "quantitative, qualitative, or mixed method approach."

In quantitative research design, behaviours, attitudes, opinions, and other variables of interest are quantified in order to find relationships between such variables. The resultant quantitative data obtained is further analyzed using various quantitative techniques such as descriptive, correlational, experimental, and quasi-experimental. The quantitative research approach has a number of advantages. First, the approach makes it possible for large volumes of data to be obtained from participants and analyzed for the purposes of generalization of the findings. Second, it permits the investigator to conduct the research in a number of groups, paving the way for group comparison. Third, it provides information relating to numerical ratings. Finally, it lends itself to statistical techniques that make it possible for the researcher to establish a relationship among variables.

Qualitative research design, however, is not based on the analysis of numerical data but rather textual data. Qualitative research design is intended to help the researcher appreciate the issues under investigation by interacting with the research participants (Denzin & Lincoln, 2008). Thus, the motivation of qualitative research is to explore and explain a phenomenon in its natural environment. Qualitative research design is intended to gather rich and in-depth information and experiences from participants in their natural setting. Denzin and Lincoln (2005) term qualitative research design as one that emphasizes "the qualities of entities and on processes and meanings that are not experimentally examined or measured" (Denzin & Lincoln, 2005, p.10). Based on the definition provided

by Denzin and Lincoln (2005), Patton (2001, p.39) provides a comprehensive definition of the qualitative research approach as:

"an approach that uses a naturalistic approach which seeks to understand phenomena in context-specific settings, such as real world settings, where the researcher does not attempt to manipulate the phenomena of interest...it is any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification, but instead the kind of research that produces findings derived at from real-world settings where the phenomena of interest unfold naturally"

So, unlike quantitative research design, in which the researcher collects numbers from a large number of research participants, analyzes those numbers, and then applies the results to the whole population from which the sample was taken, qualitative research design tries to get information from a small number of participants about their experiences and worldview.

The mixed method design is a third approach that is gaining traction among researchers. With this design, the researcher employs both quantitative and qualitative techniques to attain the aims of the study. According to Johnson et al. (2007), mixed methods research (triangulation) is an approach that tries to use several viewpoints, perspectives, positions, and standpoints to solve a research problem. It is also defined as the "type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration" (Caracelli & Greene, 1993, p. 123). So, in a mixed

method design, both numerical and textual data from different groups of people are collected, analyzed, and presented in either a sequential or a concurrent way.

Over the past few decades, the mixed method approach has piqued the interest of researchers as various academic areas, including finance, have become increasingly reliant on mixed methods research. Bryman and Cramer (2009) have looked into numerous studies that used mixed methods and have concluded that over the past years, mixed method research has received massive endorsement from researchers. Mixed methods studies combine quantitative and qualitative methodologies in a variety of ways. The use of a mixed method approach helps the researcher achieve triangulation. Triangulation is employed when a single research method is insufficient to ensure that the most thorough approach to solving a research problem is chosen. According to Morse (1991), there are two types of methodological triangulation: simultaneous and sequential. In simultaneous triangulation, the researcher simultaneously applies qualitative and quantitative methodologies to solve a research problem. Some researchers use the term to describe simultaneous triangulation that differs from Morse's (1991). For example, Creswell and Clark (2007) called them "concurrent" designs, while Teddlie and Tashakkori (2009) called them "parallel designs." The terms "simultaneous" refer to the fact that the qualitative and quantitative phases of research are taking place at the same time (Teddlie and Tashakkori, 2009). During the data collection stage, the procedures in this approach have limited interaction. The outcomes, on the other hand, complemented each other (Morse, 1991). On the other hand, sequential triangulation is used "where the result of one procedure is critical for designing the next approach" (Morse, 1991).

For the purposes of this research, a mixed method strategy, which uses both qualitative and quantitative approaches, was adopted. There are two major reasons for this choice. First, mixed methods research was adopted because it was useful for answering research questions that could not be answered by a quantitative or qualitative approach alone (Saunders et al. 2016). For instance, the current study has four specific objectives, and the first three objectives can be better achieved using quantitative techniques since they seek to establish a causal relationship among variables. In the case of research question one, the researcher seeks to examine the factors that influence FinTech adoption in SSA, and doing so requires the formulation of hypotheses to determine the effect of behavioural factors on the intention to adopt FinTech services. The nature of this research technique requires the development of a number of hypotheses in order to establish relationships between study variables. Thus, the best technique to achieve this objective is the use of a quantitative research approach. Moreover, a number of studies on the factors influencing FinTech adoption have employed quantitative research approaches to achieve their objectives (see Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012). The second and third research objectives of the study also seek to establish the effect of FinTech on consumer behaviour and bank performance, respectively. In order to achieve these objectives, hypotheses need to be formulated to determine the extent to which these variables interact. As a result, a quantitative approach in the form of correlational design was deemed appropriate in achieving these objectives. Again, a cursory look at the extant literature shows that studies examining the effects of FinTech on bank performance and consumer behaviour have primarily been conducted using quantitative techniques in order

to generalize the findings of the research. A correlational design is adopted based on the nature of the research questions.

The qualitative aspect of this research focuses on the use of in-depth interviews and other secondary documents to elicit the views and experiences participants and to gain additional insight within the FinTech ecosystem. Research question four investigates the regulatory framework within the FinTech ecosystem of SSA. Since prior information on FinTech regulation within SSA is scanty and the phenomenon of FinTech regulation is nascent, it was appropriate to comprehensively explore the concept by gathering rich and in-depth information. Since the qualitative research approach is suitable for gathering rich, in-depth, and relevant data, it was deemed appropriate for the research question four. The qualitative approach to answering research question four aided the researcher to gather adequate information from existing data and information on the regulatory framework that is currently in place in SSA.

The second reason why the mixed method design is appropriate for this research is based on the research questions formulated. FinTech is a recent phenomenon which is rapidly evolving. Thus, to gain deeper insight into the concept, the use of quantitative research design alone may not be sufficient to provide adequate and accurate information about the phenomenon. Again, to better understand the findings from the quantitative design, there is a need to obtain additional information that cannot be obtained by relying on quantitative design alone. Thus, the use of mixed methods design in this study was intended to provide valid findings that can readily be relied upon. As explained by Johnson, et al. (2007), "the application of mixed method design helps the researcher leverage the

strengths of both qualitative and quantitative research designs in to produce a significantly valid result." Thus, the use of both approaches in this study will not only help assess the relationship between the variables but also provide rich insight from the participants by considering the opinions of experts and regulators within the FinTech Ecosystem.

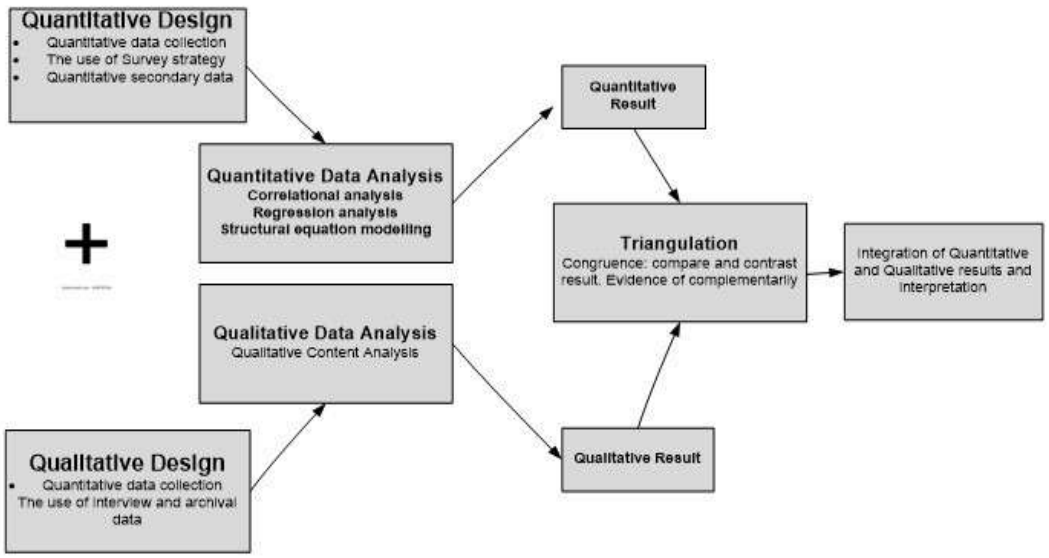
A research design can also be viewed from the perspective of the research strategy adopted. The strategy provides an explanation to the nature of the data and the approach for gathering such data. According to Saunders et al. (2018), there are six main research strategies that can be used to conduct a piece of research. These are "experiments, surveys, case studies, action research, grounded theory, ethnography, and archival research" (Saunders et al. 2018). Experiments generally follow the procedure used by the natural sciences, where the research activities and data collection are mostly done at the laboratories instead of in the field. In experiments, the researcher has significant control over the research procedure and data gathering since the process is confined to the laboratories in which the experiments are conducted. Unlike experiments, which are usually employed by the natural sciences, the survey strategy is a common strategy employed by management and business researchers (Saunders et al. 2018). It is normally used to answer research questions that focus on how, who, what, and how many. It is intended to gather data from a large number of participants in order to generalize the findings to the entire population from which the sample was taken. The case study design strategy focuses on a small number of variables from which data can be obtained. This strategy is intended to provide adequate information on a few cases of interest. In action research, the researcher is part of the participants being investigated and takes part in the processes and activities of the organization. Grounded theory is a research strategy that

focuses on the building of theories based on data obtained. Thus, the strategy follows an inductive approach where data informs the theory rather than the theory informs the nature of data and analysis. In ethnography, people who are being studied are observed for a long time to get a better picture of their environment and behaviour. Finally, archival research strategy relies on administrative documents and records to deal with a particular research problem and come up with the appropriate solution.

In light of the explanation provided above and the nature of this research, we applied the survey and archival strategies for the purposes of gathering relevant data. This survey approach was deemed relevant for some reasons. First, the current study is business research with a focus on individual attitudes, opinions, and behaviours towards FinTech adoption. As a result, a survey strategy was deemed more appropriate than the other strategies discussed above. Second, the nature of research questions in this thesis was best answered using the survey strategy since the majority of the questions posed in this research are in the form of how-and-what questions (Saunders et al. 2018). Third, the researcher seeks to gather a large amount of data for a large population, and the survey strategy was helpful in this regard. Third, since this study sought to gather quantitative data, the survey data was relevant for the researcher to achieve that through the use of structured questionnaires. Finally, because the study seeks to gather adequate information about a study population in different countries, the survey approach provides a quick, accurate, and inexpensive means of obtaining information about the study population. In addition to the survey approach, which relied on the use of closed-ended questionnaires to gather data, qualitative data will also be collected with the use of interview guides.

It must be stated that whereas a researcher may assign equal weight to quantitative and qualitative methods in a single study, an unequal weight may also be applied depending on the nature of the research problem and questions (Creswel, Plano and Clark, 2007). In the current study, there are three specific research questions that required the use of quantitative techniques to answer. However, one of the specific objectives is dependent on the qualitative technique. Thus, priority is given to the quantitative approach as far as this study is concerned. The main research questions in this study can best be answered by using correlational techniques to establish causal relationships, which demands the application of a quantitative approach. The qualitative research approach is intended to be used to answer one of the research questions and also provide a further explanation of the questions answered through the use of quantitative techniques. Figure 3.1 describes how the mixed method approach (using concurrent approach) is implemented in this study.

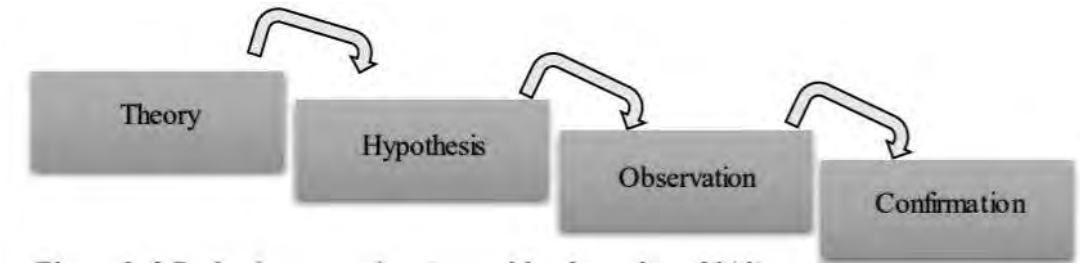
Figure 3.1: Approach of Mixed Method Design



Quantitative data is collected using the survey and secondary data and analyzed using quantitative data analysis techniques such as SEM, correlation analysis, and regression. The qualitative data is also gathered from interview and archival sources and analyzed by applying content analysis. The two results are then compared, contrasted and integrated in the analysis part of the study.

Trochim (2006) distinguished between deductive and inductive thinking, referring to them as the "two basic ways of reasoning" (Trochim, 2006, p17). Deductive method is characterized as going from general to specific, whereas induction is defined as going from a particular case to a general case. This definition has the support of a number of well-known researchers in the field (see Saunders, 2019). According to Creswell and Clark (2007), deductive scholars operate from theory to hypotheses and to observation with the view to either confirming or disputing existing theories (see Figure 3.2). Inductive research, however, is described as a "bottom-up" strategy in which the researcher leverages the perspectives of the research participants to build themes and a theory that connects them (Creswell and Clark, 2007).

Figure 3.2 Deductive research approach



Inductive researchers frequently criticise the deductive research strategy because it uses a set of methodologies that prevents a new explanation of the hypothesis from being offered. Despite this harsh criticism, deductive reasoning is widely used in social scientific research (Alvesson and Skoldberg, 1994), "and is typically connected with quantitative data analysis" (Williams, 2007). This is in line with Biber and Johnson's statement (2015, p. 42) that "quantitative research is supposed to be value-neutral, deductive, and generalizable." Inductive research, on the other hand, is frequently associated with qualitative research analysis and interpretive research philosophy (Biber-Hasse, 2016). A researcher that uses deductive research will frequently test hypotheses quantitatively, looking for data to support or refute the theory. On the other hand, inductive researchers start by collecting qualitative data from participants. This lets them find themes that they can use to build a theory (Creswell and Clark, 2007).

For the purposes of this study, a deductive approach is widely applied. The study's conceptual framework was created deductively based on many theoretical assumptions examined in the literature, which are presented in Chapter 2. To put it another way, the conceptual framework was derived from theories and research. First, the researcher conducts a critical evaluation of the FinTech and digital innovation literature, which aids in the identification of the field's core theories and knowledge gaps. The critical review was followed by a theoretical framework. The researcher generated the study's hypothesis after conducting a theoretical framework. After that, the researcher gathered information from primary and secondary sources. Furthermore, the study’s variables were separated into predictor, outcome, and control variables by the researcher, providing further support for the application of a deductive approach.

3.2.3 Research Settings

The current study was undertaken using data from four SSA countries. In total, there are 46 SSA countries, and all of these countries are actively involved in the acceptance and promotion of FinTech services. However, given the nature of the study, it would have been practically impossible to gather data from all these countries. As a result, a strategic decision was taken to select some countries for the purposes of data gathering and analysis. A number of criteria were used to decide on the best countries to include in the study. First, the level of FinTech activities was considered as a major criterion since participants must understand these FinTech concepts. Second, the ability of the researcher to gather relevant data was also highly considered. Based on these criteria, four countries were chosen. These countries include South Africa, Nigeria, Kenya, and Ghana. They are found among the top 65 FinTech countries in the world (see Figure 3.3). These countries are rated highly in terms of FinTech adoption and usage (EY, 2019). South Africa, Kenya, Nigeria, and Ghana are ranked 37th, 42nd, 52nd, and 58th respectively in the global FinTech ranking. They are, therefore, considered the powerhouses as far as FinTech in SSA is concerned. The use of these countries helped the researcher to obtain relevant information to support the analysis and presentation of the results.

Figure 3.3 Global FinTech ranking (2020)

Global Fintech Rank	Change from Startup Rank	Country	Total Score
1	±0	United States	31.789
2	±0	United Kingdom	23.262
3	+18	Singapore	19.176
4	+14	Lithuania	17.343
5	+3	Switzerland	16.018
6	±0	The Netherlands	14.464
7	±0	Sweden	14.272
8	-3	Australia	13.555
9	-6	Canada	13.322
10	+3	Estonia	13.303
11	-2	Germany	12.787
12	-8	Israel	12.771
13	-3	Spain	12.372
14	-2	Finland	12.110
15	+2	India	12.024
16	-5	France	11.803
17	-3	Ireland	11.754
18	+1	South Korea	11.543
19	+18	Brazil	11.456
20	-4	Denmark	11.368
21	+6	China	11.143
22	+1	Japan	11.114
23	+30	Luxembourg	11.088
24	+1	Italy	10.772
25	+3	Austria	10.660
26	-2	Belgium	10.586
27	+19	Norway	10.497
28	+1	Portugal	10.394
29	-9	Poland	10.364
30	+2	Mexico	10.294
31	-9	Czechia	10.188
32	-17	Russia	10.052
33	+56	Malta	9.983

Global Fintech Rank	Change from Startup Rank	Country	Total Score
34	+6	United Arab Emirates	9.928
35	-5	Chile	9.746
36	+11	Malaysia	9.692
37	+14	South Africa	9.614
38	+6	Argentina	9.425
39	-6	Thailand	9.415
40	-6	Colombia	9.289
41	+1	Greece	9.210
42	+10	Kenya	9.039
43	-12	Ukraine	8.969
44	-1	Turkey	8.937
45	-19	New Zealand	8.893
46	+8	Philippines	8.831
47	-6	Indonesia	8.658
48	+20	Cyprus	8.380
49	-4	Latvia	8.329
50	new	Taiwan	8.321
51	+21	Vietnam	8.118
52	+4	Nigeria	7.918
53	-14	Hungary	7.742
54	-6	Slovenia	7.607
55	+2	Peru	7.575
56	-21	Bulgaria	7.542
57	-19	Romania	7.447
58	+17	Ghana	6.632
59	-4	Belarus	5.986
60	±0	Egypt	5.676
61	+26	Bangladesh	5.073
62	-1	Pakistan	4.675
63	+8	Uruguay	4.562
64	+17	Uganda	4.037
65	+17	Lebanon	3.941

Source: The Global FinTech Index, 2020

3.3 Population and Sample of the research study

Saunders et al. (2019) describe a research population as the collection of individuals or objects that are the focus of a scientific enquiry. These individuals or objects have similar characteristics and attributes that are of interest and relevance to the researcher (Bartlett et al., 2001; Creswell, 2003). To achieve the study's objectives, the general population needs to be refined. The refinement process is necessary to take out individuals or objects whose involvement will compromise the quality of the data obtained and hence the research goals. The refined population, also known as the target population, has specific attributes that will advance the quality of the research. In this study, the target population includes university students and commercial bank officials, and Fintech firm managers/operators in four Sub-Saharan African countries. These countries include Ghana, Nigeria, Kenya, and South

Africa. Even though a significant number of people are exposed to the concept of FinTech, the above-mentioned target population better understands the concept and applies it on a daily basis. For instance, young people are more familiar with the use of FinTech services compared to other populations (Ernst & Young, 2017). Also, bank officials and FinTech firm operators/managers deal with FinTech products and services on a regular basis and therefore have an in-depth understanding of their adoption, impact, and regulation.

Given the populations described above and the large sizes involved, it was practically impossible to elicit responses from every member of the population. In view of this practical challenge, a sample was chosen from each of the populations for the purposes of data collection and presentation. Saunders et al. (2019) posit that sampling involves selecting some individuals or objects from the target population with the view to using such a sample to represent the population from which they were selected. It can also be described as a subset of individuals or objects from a given target population used to determine the characteristics of the whole population.

Various techniques are available in management research to help researchers select a sample from the population. These techniques are broadly grouped into probability and non-probability sampling techniques. Sounder et al. explain that "in a probability sampling technique, all individuals or objects within the target population have a chance of being included in the sample" (Saunders et al. 2019; Creswell, 2003). However, in non-probability sampling, not every individual or object within the target population has the chance of being included as part of the sample. Non-probability sampling methods were used in this study, and these are purposive and snowball methods. Purposive sampling "is

a type of non-probability sampling in which the researcher chooses a sample from the population based on stated characteristics that will help meet the objectives of the study" (Saunders et al. 2019). The purposive sampling technique was selected because of its key practical criteria, such as knowledge of the subject matter, accessibility, and geographical proximity, can easily be met (Ilker et al., 2016). Students who frequently use FinTech services, earn some form of income, and were available and ready to respond to the online survey were recruited for the study. To obtain more respondents to participate in the study, a snowball sampling was used in addition to the purposive sampling technique to recruit participants for the study. "Snowball sampling is a non-probability sampling method in which current research participants help recruit new participants for the study" (Saunders et al. 2009). In this study, participants who were contacted earlier assisted in the recruitment of other participants. With regards to the population of bank and FinTech firm officials, because the study sought to obtain information from officials who would be in a position to provide information on the impact of FinTech, only departmental heads and officials were recruited for the data collection process.

The sample for the research was chosen using a number of criteria. First, four countries were chosen to represent countries in Sub-Saharan Africa based on the fact that these countries have high rankings with respect to FinTech adoption and usage in SSA (Global FinTech Ranking, 2020). Second, university students were chosen from these countries for the purposes of obtaining information on the factors influencing their adoption of mobile FinTech platforms. There are some reasons that necessitated the use of students to gather data for this study. First and foremost, these students are digitally compliant and therefore understand the FinTech ecosystem more than any other group

(Ernest and Young, 2019). They mostly use digital platforms and are therefore seen as playing a significant role in the global digital space. Furthermore, the universities were selected because they have a finite population, and therefore the sample size is easy to determine. Again, university students are recruited from all walks of life, and therefore they fairly represent the general population in terms of religion, tribe, and geography. For the purposes of data collection, the current study focuses on respondents who use FinTech products and services.

According to Saunders et al. (2019), in determining the sample size for quantitative data, a number of factors such as the sampling error, the representativeness of the sample, and the nature of statistical tests must be considered. Hair et al. (2010) indicated that a minimum of 5 observations per variable (5:1) is required for conducting a multivariate quantitative analysis, and a sample size of 10 observations per variable is considered adequate (10:1). Based on these propositions, a sample of 120 university students from each of the selected countries would suffice, given the number of study variables. Overall, 241, 212, 175, and 190 students were recruited from Ghana, Nigeria, Kenya, and South Africa, respectively. In addition, 37, 33, 30 and 32 bank officials from Ghana, Nigeria, Kenya, and South Africa were respectively recruited. These sample sizes are deemed sufficient for the nature of the analysis conducted in this study. Furthermore, 24 FinTech and Bank officials drawn from the selected countries were interviewed to elicit their opinions on the research topic. Table 3.1 presents the summary of the above information

Table 3.1 Sample Sizes for students and Bank officials

	Questionnaire/Survey Respondents		Interviewees
Country	**Student Sample**	**Bank Sample**	**FinTech/Bank Officials**
Ghana	241	43	6
Nigeria	212	34	8
Kenya	175	26	5
South Africa	190	29	5
Total	**818**	**132**	**24**

3.4. Materials/Instrumentation of Research Tools

Vargas (2017) has opined that information and existing databases on FinTech are complex to gather due to the developing nature of FinTech research. The use of structured questionnaires and interviews has therefore become the most efficient means for obtaining data on the sector. It is therefore not surprising that studies such as Gimpel et al. (2018) and PwC (2017), among others, have adopted the use of primary data to conduct research in the area of FinTech. In this research, questionnaires, interview responses, and existing official documents served as the main sources of data. The questionnaires/surveys were designed to ensure that all the major constructs expected to be applied to assess the views and perspectives of participants were captured. Since there are existing constructs measuring FinTech adoption, FinTech growth, and consumer behaviour towards FinTech, among others, these constructs were adapted to suit the current study. A thorough search of published articles and peer-reviewed journals was conducted to identify existing and validated research instruments that might be appropriate for this study. The instrument was further refined to suit the current conditions in consultation with the research supervisors

and other professionals within the FinTech ecosystem. Piloting of the research instrument was done with the view to improving the validity of the data collection tools. .

The research instrument for students and bank staff was presented using a five-point Likert-scale. Participants were required to express their views on certain statements on a scale that ranges from 1 to 5. The likert scale format was used because it gives respondents the opportunity to indicate their views on a given matter. It also makes it easier for the responses to be quantified (Bryman & Bell, 2012). According to McDaniel & Gates (2006), when the researcher wants to gauge the respondent's attitude towards constructs, a Likert scale is suitable. In a number of studies on technology adoption, Likert scales were employed to assess attitudes and perceptions. Some of these studies include Alshehri et al. (2012) and Venkatesh, Thong, and Xu (2012). It had two main sections. The first section elicited demographic details from the participants. The second looked at FinTech knowledge and usage. It focused on FinTech adoption by examining respondents' views on security, risk, convenience, ease of use, savings, borrowing, and investment using FinTech, among others. The questionnaires for bank officials had four sections. The first section dealt with demographic information; the second focused on FinTech adoption; the third focused on questions relating to FinTech growth and its possible impact on the banking sector; and the fourth section focused on FinTech regulation.

In addition to the structured questionnaires, a semi-structured interview guide was designed to obtain additional information on the influence of FinTech on the traditional banking industry in the eyes of bank officials. An interview guide was also designed to elicit responses from bank officials, which is important for complementing the quantitative

analysis. The interview was purposefully designed for people who are within the ranks of managers and who are linked to technology, innovation, and FinTech within the banking sector. This is relevant in ensuring that data obtained is valid and can be relied upon for further analysis. The interview process afforded the researcher the opportunity to obtain comprehensive and extensive information, which is required to deepen the understanding of the problem under investigation. The interview consisted of semi-structured questions, which were further divided into four parts. Part A focused on the demographic characteristics of the respondents. The second part is made up of four questions, which are designed to obtain the views of respondents on FinTech adoption. The third part consists of three questions, which are constructed to elicit the views of respondents regarding the influence of financial technology on banks. The fourth section has ten questions, and these questions are constructed to gain extensive insight into FinTech regulation within the selected countries. It is also intended to aid the researcher in answering research question four. The interview guide was also designed by following best practises and adapting similar instruments from existing and validated studies. The various research tools employed in this study are captured in Appendix 1.

3.4.1 Structure of the questionnaire

Two surveys, consisting of bank staff and university students, were conducted. The majority of the questions from both sets of questionnaires were designed using a five-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5) (five points)". The structured questionnaire for students was organised under three sections. These sections are explained as follows:

- **Section A:** This section has questions relating to the demographic and background information of FinTech respondents were captured. The age of the consumers, their education, sex, income, and employment status, among others, were captured under this section.
- **Section B:** This section has questions measuring respondents' understanding, knowledge, and usage of FinTech services.
- **Section C:** The section has questions designed to measure the attitude and behaviour of consumers regarding FinTech adoption.

With regards to the bank staff survey, a number questions were separated under five main sections.

- **Section A**: This section elicits the demographic and other background information of the bank's respondents. The information elicited under this section includes age, sex, income, education, and position.
- **Section B**: This section has items relating to the benefits of FinTech adoption were captured under this section.
- **Section C**: The section contains items relating to the application of FinTech models, which were elicited from the respondents under this section.
- **Section D:** This section contains items/questions about the growth of non-bank FinTech platforms that were presented to respondents to elicit their views.
- **Section E:** The section has items relating to the influence of FinTech activities on bank performance that were elicited from respondents.

- **Section F**: This section has questions eliciting information about the views of bank officials regarding FinTech regulation. It was presented under this section.

3.4.2 Structure of the Interview Guide

A semi-structured interview guide was designed and sent to bank officials in Ghana. The focus of the interview was to gain a deeper understanding of the various issues of interest in this study. The interview focused on three thematic areas, which include FinTech adoption, influence of FinTech on banks; and FinTech regulation. The interview guide was structured into four sections. Section A focused on the demographic characteristics of participants, which comprised sex, age, education, position, and experience. Section B focused on issues relating to FinTech adoption. In section C, questions relating to competition and/or collaboration among banks and FinTech firms were asked. Finally, in section D, participants' views on FinTech regulation were sought. The interview was conducted using two main approaches. These include telephone and face-to-face. These approaches were adopted based on the requests of interviewees. The interviewees were asked questions in relation to the research questions and objectives. In all, a total of 24 respondents agreed to participate in the study, and the interview process took place between May and August 2021. The interviewees were selected using the purposive sampling approach, as cases deemed relevant for the study were identified and included and interviewed.

3.5 Operational Definition of Variables

One aspect of quantitative research design is the operational definition of study variables. Since there are various variables in this study, there is a need to explain how

these variables are defined and measured. Discussing the operational definition of variables does not only provide a succinct illustration of how the researcher perceives the variables, but it also provides a clear understanding of how the variables are measured and quantified. Thus, an operation definition is important in ensuring that a succinct description of concepts is provided to aid the gathering of the right kind of data. The operational definition of variables in research, especially in quantitative studies, is important in four different ways. First, it serves as the blueprint and procedure for measuring the study variables. Second, it gives an unambiguous definition and meaning of the concepts and terms that would otherwise be interpreted in different ways. Third, having an unambiguous definition of the variables makes the data collection and analysis more focused and efficient. Last but not least, the operational definition is very important because it will help the researcher figure out what kind of data to elicit from both primary and secondary sources (Saunders et al. 2018). From the perspective of this study, the various variables and their definitions are presented under this section. The operational definition of the variables is based on validated and published studies that have considered the subject of FinTech adoption. The study variables are categorised into dependent variables, independent variables, and mediator variables. These variables are defined as follows.

3.5.1 Operational Definition of Study Variables for Research Question 1

Research question one focused on the factors influencing Mobile Payment and Transfer FinTech (MPT) acceptance and use in SSA. A cursory examination of the extant literature indicates that many constructs or variables that are associated with FinTech adoption. The current study identifies variables or factors that are relevant for the Sub-Saharan African region. To this end, the TAM and UTAUT models, in addition to other

relevant and proven theories, are considered. Specifically, the selection of variables is based on the risk and potential benefit of FinTech innovation.

Kim et al. (2008) explain that perceived benefit is a construct that assesses how much better the technology will be than the status quo. Perceived benefit, according to different perspectives, is the consumer's opinion of the benefits obtained from using a product or service. The greater the perceived value of a technology, the more likely it is to be adopted by the user. Economic benefits, ease of use, convenience, and perceived usefulness are the four areas of reported benefits in this study (Haqqi and Suzianti, 2020).

According to existing research, perceived risk is a significant factor that can deter people from adopting FinTech services. A user's impression of the possibility of negative uncertainty as a result of using FinTech services is referred to as perceived risk (Haqqi and Suzianti, 2020). Perceived risk is a direct negative antecedent of adoption intention, according to Stewart and Jurgens (2018), but trust can lessen perceived risk and favourably affect adoption intentions. Perceived risk is divided into four categories for the purposes of this study: financial risk, legal risk, security risk, and privacy issues. The variables and their operationalization are categorised into dependent, independent, and mediating variables. The description of the various variables and their measurements is presented as follows:

Dependent Variable:

FinTech Adoption (ADP): As far as the first objective of this study is concerned, the dependent variable is mobile FinTech adoption. For the purposes of this study, FinTech adoption is operationally defined as the use of any of the FinTech services

or products such as mobile money payment, crowdfunding platforms, cryptocurrency, and other electronically mediated financial transactions. This definition is based on the studies by Lee (2009) and Stewart and Jurjens (2018). Four separate questions are used to measure FinTect adoption. An ordinal scale based on a five-point Likert scale format, which ranges from "strongly disagree" to "strongly agree," was applied for the purposes of measuring each of the items that make up the FinTech adoption construct.

Independent (Predictor) Variables

1. **Perceived usefulness (PUS):** this variable/construct is defined as the extent to which consumers of FinTech products/services perceive these products as potentially contributing to the enhancement of their job performance. Davies, 1985). This construct is measured using four separate items based on an ordinal scale. A five-point ordinal scale ranging from "strongly disagree" to "strongly agree" was applied.

2. **Ease of use (EOU):** The definition of this construct/variable is derived from Davies' definition for the purposes of this study (1985). According to Davies, "perceived ease of use" refers to how confident consumers are that a certain technology's application would be simple to understand and utilize. The concept is measured using four items that were modified from studies by Bhattacherjee (2001) and Davis et al. (1989). The items are measured using an ordinal scale. They're displayed on a five-point Likert scale ranging from "strongly disagree" to "strongly agree."

3. **Convenience (CVC)**: In this research, convenience is operationally defined using Okazaki and Mandez's (2013) research. It refers to the flexibility that comes with using mobile payment FinTech. This flexibility could be determined by time and location. This variable is measured using five different items. Based on the ordinal scale, a five-point Likert scale spanning from "strongly disagree" to "strongly agree" is used.

4. **Economic Benefit (ECB):** As far as this study is concerned, perceived economic benefit is defined as the belief that FinTech adoption and usage results in desirable economic outcome. This variable is measured on the ordinal scale and the responses ranges from strongly disagree (1) to strongly agree (5).

5. **Financial Risk (FRK):** This is the concern that users of mobile FinTech platforms may lose some money in the process. This construct is also measured using a five-point likert scale based on the ordinal scale. The items measuring financial risk are adapted from Ryu (2018).

6. **Security Risk (SRK):** This is the possibility that FinTech users may lose some money due to the unscrupulous activities of fraudsters and hackers, which could compromise the security of mobile FinTech transactions. Five items are used to measure this construct, and they are adapted from the study by Ryu (2018). We also modified and applied the security construct used by Hur and Lim (2017) as well. The items are designed based on a five-point likert scale, which ranges from "strongly disagree" (1) to "strongly agree" (5), based on the ordinal scale.

7. **Operational Risk (ORK)**: This risk refers to the possible losses likely to be incurred by users of FinTech products and services as a result of failed internal processes and systems, as well as failures on the part of employees to adequately execute their tasks (Ryu, 2018). Operational risk, for the purposes of this study, is measured by adapting the five items proposed by Ryu (2018). These items are measured using a five-point likert scale, and the responses range from "strongly disagree" to "strongly agree". The construct is therefore measured using an ordinal scale.

8. **Legal Risk (LRK):** Legal risk is the possibility that the lack of clear regulation and rules regarding FinTech adoption could influence consumer acceptance of FinTech services (Rhu, 2018). This variable is measured using three items and these items are presented on a five-point likert scale.

9. **Privacy Concerns (PVC):** This construct/variable is characterized as the fear that personal data and information from mobile FinTech users would be shared with unauthorized parties without their consent (Patterson, 2015). Four separate questions were used to assess this variable or construct. This construct is measured using a five-point Likert scale based on the ordinal scale. The questions' possible responses range from "strongly disagree" to "strongly agree."

Mediating Variables

1. **Knowledge/Awareness (AWN):** This refers to the understanding of FinTech products with regard to their benefits and risks. It is an ordinal variable measured

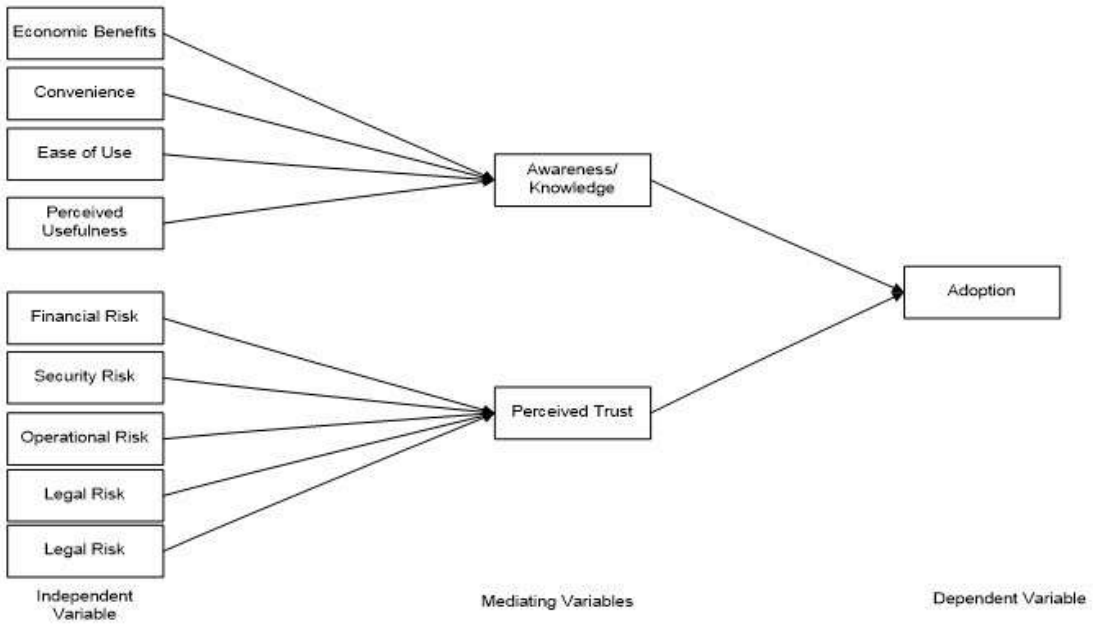
by five items on a five-point likert scale. The responses range from "strongly disagree" to "strongly agree". The items used to measure this construct are adapted from the study by Stewart and Jurgens (2018).

2. **Trust:** refers to the belief by the FinTech consumer that the transaction will go through as expected and that information provided in the course of the transaction cannot be assessed by unauthorized parties (Chellappa & Pavlou, 2002). Several studies (Kim et al. 2008; Bhattacherjee, 2002) have discovered a strong relationship between trust and technology adoption intentions. As a result, we think that more trust will have a direct and positive effect on people's intentions to use FinTech. Table 3.2 and Figure 3.6 summarizes of the study variables and their sources.

Table 3.2: summary of study variables and sources from literature

Variable	Source	Type of variable
FinTech Adoption	Stewart and Jurjens (2018), Ryu (2018)	Dependent Variable
Perceived Ease of use	Stewart and Jurjens (2018),	Independent variable
Perceived Usefulness	Stewart and Jurjens (2018),	Independent variable
Economic Benefit	Stewart and Jurjens (2018), Ryu (2018)	Independent
Convenience	Stewart and Jurjens (2018), Okazaki and Mandez (2013).	Independent
Privacy concerns	Marinos & Lourenco, (2019)	Independent
Perceived risk	Stewart and Jurjens (2018),	Independent
Financial risk	Stewart and Jurjens (2018), Ryu(2018)	Independent
Security risk	Hur and Lim (2017)	Independent
Operational risk	Ryu (2018).	Independent
Legal Risk	Ryu (2018).	Independent
Trust	Chellappa & Pavlou, 2002	Mediating
Knowledge(Awareness)	Stewart and Jurjens (2018),	Mediating

Figure 3.4: Diagrammatic illustration of the relationship among the study variables (Research question 1).



3.5.2 Operational Definition of Study Variables for Research Question 2

The FinTech evolution has had a substantial impact on consumers and the mode in which they access financial (Frame et al., 2018). The most impacted areas of finance are savings, personal finance, investment and wealth management, lending, mortgages, payments, and insurance. Research objective 2 is intended to examine the influence of FinTech adoption on savings, borrowing, and investment. The dependent, independent and control variables are defined as follows:

Dependent Variables

Savings: For the purposes of this study, the savings binary variable assumes two values: "yes" and "no." Responses indicating that the respondent has a savings product are coded "1," whereas no savings product is coded "0."

Investment: Investment is also designated as a dichotomous variable which assumes two values, “yes” and “no”. Responses indicating that the respondent has investment products is coded “1”, whereas no investment product is coded “0

Borrowing: Borrowing is also designated as a dichotomous variable which assumes two values, “yes” and “no”. Responses indicating that the respondent has borrowed recently is coded “1”, whereas no borrowing is coded “0 otherwise

FinTech adoption/usage is used as independent variable. FinTech usage, which is a dummy variable is coded 1 if an individual report as ardent user of mobile payment FinTech, and “0” if otherwise.

Table 3.3 summarizes the variables and their operational definition.

Table 3.3 Study variables and their definition for research question 2

Measure	Variable	Definitions
Savings (Dependent)	FinTech for savings	1 if the respondent indicate the use of FinTech platform for savings, and 0 if otherwise
Investment (Dependent)	Investing with FinTech	1 if the respondent indicate the use of FinTech platform for investment, and 0 if otherwise
Borrowing (Dependent)	Borrowing through FinTech platforms	1 if the respondent indicate the use of FinTech platform for borrowing, and 0 if otherwise
FinTech (Independent)	1. Use of Mobile FinTech	1 if ardent user of mobile FinTech and 0 if otherwise
	2. Use of crowdfunding	1 if ardent user of crowdfunding platforms and 0 if otherwise
	3. Use of crypto currency	1 if user of peer-to-peer platforms, 0 if otherwise
	4. Use of peer-to-peer platforms	
	5. InsurTech	1 if user of InsurTech platforms, 0 if otherwise
Control variables	6. Sex	1 if female, 0 if male
	7. Education	1 if first degree and above, 0 if below first degree
	8. Age	Age of respondent

Age: For the purposes of this study, Age is operationalized in numeric years provided by the respondent. This is a continuous variable and therefore measured as a scale. Age is included as a moderating variable because according to Arvidsson (2014), age has a substantial effect on the attitude of individuals towards the mobile payment acceptance.

3.5.3 Operational Definition Variables in Research objective 3

The third objective of this study is to assess how the growth or usage of FinTech affects the performance of traditional financial institutions, especially traditional commercial banks. The performance of the banks was assessed using both financial and non-financial indicators. Unlike financial indicators, which are based on financial statement figures, non-financial data provides a way of assessing the performance of the bank using various off-balance sheet indicators such as the number of customers, number of deposits, and number of accounts closed in the past years. Three major variables are used to measure performance. The dependent latent variable (bank) performance was measured by three items based on balanced score card dimensions. These dimensions include market share, profitability, and accounts creation. These items are described as follows:

Market share: Since market share is an important indicator of bank performance, it was used as one of the indicators to measure performance. Research participants were required to specify the degree to which FinTech has affected the market share of the banks. The variable was measured using ordinal scale. It is an ordinal variable measured by five items. The responses ranges from “strongly disagree” to “strongly agree”.

Number of Accounts created: The second variable measuring performance of the bank is the number of accounts created. Participants were required specify their level of agreement or disagreement with the impact of FinTech on the number of accounts created.

The variable was measured using ordinal scale. It is an ordinal variable measured by five items on a five-point likert scale. The responses ranges from “strongly disagree” to “strongly agree”

Profitability: The third variable measuring performance of the bank is financial performance which is proxy by profitability. The variable was measured using ordinal scale. It is an ordinal variable measured by five items on a five-point likert scale. The responses ranges from “strongly disagree” to “strongly agree” Usage of mobile money services such as value of mobile money transactions, number of mobile money accounts, and the number of mobile money agents will be used as proxies for measuring FinTech innovation in SSA (AFI, 2019).

The independent variable is the growth of FinTech, and it is measured by three dimensions, which are adapted from the FinTech growth and development indices by the Global FinTech Index. These measures include the quantity of FinTech firms and products, the quality of FinTech delivery, and the quality of the infrastructure and regulatory framework

Table 3.4 Study variables and their measurement (research Question 3)

Variable	Measurement	Type of Variables
Bank performance	Ordinal scale (1 strongly disagree to 5, strongly agree)	Dependent Variable
FinTech Growth	Ordinal scale using three items	Independent Variable
FinTech Usage	Ordinal scale (1 strongly disagree to 5, strongly agree	Mediating variable

The mediating variable, which is FinTech usage, has three dimensions, which are the actual use of FinTech services. All three variables were measured by applying a 5-point Likert scale.

Aside from the survey data, which was used to access the influence of Fintech adoption on the performance of the banking sector, secondary data was also collected and analysed to complement the survey data. To achieve this, bank performance measures using ROA and ROE were employed. These financial ratios have been identified as the best measures of performance as far as the banking sector is concerned (Yuksel et al., 2018). The financial reports of the four banks (Standard Chartered Bank, Absa Bank, and Ghana Commercial Bank) were gathered and data extracted from 2010 to 2019. The ROA was measured as the ratio of profit after tax to the total assets of the business. The ROA was also measured as the ratio of profit after tax to the total equity of the business. Thus, these variables were used as dependent variables in this study.

As we sought to examine the influence of FinTech on the performance of banks, we employed two measures to determine FinTech adoptions as used in the existing literature. These are the number of active mobile money users and the volume of mobile money transactions (AFI, 2019). This data was gathered from the reports of the respective central banks of the four selected countries. The data was collected from 2010 to 2019, as the usage of mobile money and FinTech services gained significant momentum in the last decade. As a result, the variables (number of active mobile money users and volume of mobile money transactions) served as the study's independent variables. The apriori expectation is

that these variables will have a negative effect on the performance of banks, as fintech firms and mobile money transactions serve as competition for bank transactions.

Other explanatory variables that have been used in the extant literature were also used to examine their influence on the performance of banks in the era of FinTech innovations. Two bank-specific measures—deposits and size—were employed, whereas inflation and GDP growth were employed as macro-economic variables (Almaqtari et al., 2018).

Given the dependent and independent variables, two models are proposed. The first model (Model 1) has ROA as the dependent variable and the other variables as independent variables. The second model (Model 2) uses ROA as the dependent variable along with other independent variables.

The models are specified as follows:

$$ROE_{it} = \alpha_0 + \beta_1 Mob_t + \beta_2 x_t + e_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

$$ROA_{it} = \alpha_0 + \beta_1 Mob_t + \beta_2 x_t + e_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where ROA and ROE are measures of financial performance of the banks

Mob_t represent mobile money transaction indicators,

x_t represent other independent variables such as bank size, deposit mobilization, GDP, and inflation.

e_{it} represent the error term

α_0 represent the intercepts

$i = 1....., N$ represents the cross-sectional portion of the data

$t = 1.....,T$ represent the time-series portion of the data

To examine the relationship between bank performance and FinTech related variables, panel regression analysis was conducted. Panel regression techniques makes it possible to

3.6 Study Procedures and Ethical Assurances

The UNICAF Research and Ethics Committee (UREC) gave its clearance prior to data collection for this project. This paved the way for the data collection procedures and processes to begin. The current study's main purpose was to examine the impact of FinTech on consumers, banks, and regulatory responses in SSA. A mixed-method research approach was used to achieve this purpose. This implies that both numeric and textual data were gathered and analysed using quantitative and qualitative data analysis techniques.

Vergas (2008) has opined that obtaining information about the FinTech sector is not easy. The difficulty in gathering information from the sector may be attributed to the fact that FinTech is a developing research area. FinTech is seen as an emerging concept that is still evolving, and therefore, obtaining data in the area is quite difficult. In view of this, various authors who have conducted research on FinTech have identified interviews, structured questionnaires, and existing literature as the most efficient methods for undertaking research on FinTech (PWC, 2017; Delotte, 2017; Gimpel, 2015). So, the main tools for gathering data have been structured questionnaires and interviews.

Structured questionnaires were designed and administered to two sets of respondents. These include students of selected universities in four SSA countries. The second set of respondents includes selected commercial bank officials from four SSA

countries. In addition to the structured questionnaires, an interview guide was designed and administered to selected bank officials in Ghana. The students were selected because they have experience in mobile FinTech applications and were better placed to respond to the questions in the survey. The bank officials (branch managers and operational managers) were chosen because they know a lot about how the bank uses technology to help people get financial services.

Data was derived using an online survey. This approach was facilitated by the use of Google forms. This approach was adopted for a number of reasons. First, online surveys have become one of the essential tools for gathering data for marketing, business, and social science research. It also makes it possible to reach respondents that will be difficult to reach if an ordinary face-to-face survey approach is employed. Again, the COVID-19 pandemic also makes it convenient to adopt the online survey approach since person-to-person contacts are avoided as much as possible. Furthermore, the quality of online surveys in obtaining data has been confirmed by several authors. For instance, according to Revilla et al. (2015), there is no significant difference in the validity of employing face-to-face versus online questionnaires. The application of internet-based surveys also allowed for the collection of huge amounts of data, ensuring that the results could be repeated to cover additional populations.

The questionnaires were designed by adapting questions from existing studies such as Venkatesh et al. (2012), Stewart and Jurgens (2018), and Ryu (2018). These questions were adapted because they have been tried and tested for their reliability and validity. Furthermore, these questionnaires have been extensively applied to gather data relating to

technology adoption, the impact of technology, and regulatory requirements on the use of technology. However, to ensure that the questions fit the African context, some aspects of the existing questionnaires were modified. The question questionnaires were closed format, which enabled the respondents to determine the appropriate responses. Some of the questions were tagged as mandatory, which meant that respondents had to answer them to submit the form. The mandatory questions were introduced to ensure that key questions are not left unanswered. It was also done to ensure that the validity of the responses was not compromised. Also, responses that the researcher believes are unsatisfactory were removed from the study.

To administer the questionnaires using the Google forms, the institutions where participants were recruited were contacted by the researcher through e-mail to provide the contact details of the prospective respondents. These contact details were obtained in the form of e-mail addresses. The researcher also provided a gatekeeper letter indicating the purpose of the research and the rights of respondents. The institution involved provided the necessary e-mail details of the respondents, and this made it possible for the researcher to reach the prospective respondents. The link to the online survey (a Google form) was shared with the prospective respondents through their email. The blind carbon copy (Bcc) feature in e-mail was employed to ensure that responders did not identify other potential respondents.

In addition to the online survey, interviews were conducted with banks from Ghana. A semi-structured interview was crafted based on existing studies on FinTech regulation and sandboxing. Telephone and face-to-face interview approach was used to interview

each of the interviewees. The semi-structured questions were sent to the interviewees a week before the actual interview took place. This was done to ensure that the respondents had prepared adequately for the interview process.

The current research involves human participants, and therefore issues of ethical standards need to be prioritized. As previously stated, approval from the Unicaf Research and Ethics Committee (UREC) was acquired prior to data collection in this project. The goal of research ethics is to guarantee that studies are carried out in a way that does not harm participants or society as a whole. According to the British Psychological Society (2010), research ethics is concerned with the moral principles that guide a piece of study from its conception through its completion and publishing. It also entails following the proper processes, norms, and morals when doing a research project. Research ethics, according to Vanderstoep and Johnston (2009), also includes how a researcher handles its participants and how data acquired from research activities is managed.

The ethical concepts of autonomy, beneficence, non-maleficence, and fairness were scrupulously observed to guarantee that this research was done within the bounds of acceptable ethical standards. First, the principle of autonomy, which ensures that informed consent and the free will of participants are respected, was adhered to. Since the researcher believes that participants in the research have the right to freely decide whether to participate or not without any form of coercion, the informed consent of these participants is first sought. The study's goal was explained to them, and they were given the option of participating or not participating. Furthermore, respondents were given the option to opt

out of the study at any time (before, during, or after completion) with no repercussions and without providing an explanation.

Second, the ethical principle of non-maleficence was followed, which specifies that volunteers should not be subjected to any form of harm, whether psychological or bodily (Parahoo, 2006). The names of participants, for example, were not required as part of the information sought, and this was done to protect the identity of participants. In addition, the data submitted by participants was securely preserved to guarantee that unauthorised individuals did not have access to it. For instance, in this research, data was gathered through an online survey data collection system known as Google Form. Since some respondents were sent e-mails to complete the online forms, an effort was made to ensure that prospective respondents receiving the emails would not be able to identify other respondents. This was done by employing the Blind Copy Carbon (Bcc) feature when sending email. Also, information gathered through the online platform was processed and kept safe so that information given by participants wouldn't be accessible to people who shouldn't have it.

The beneficence principle assures that the results of a study benefit both the participants and the wider public (Beauchamp & Childress, 2001). The current study is expected to help not only the general population but regulators and the financial sector as a whole. Also, as different groups of participants were involved in this research, an effort was made to ensure that all groups were treated with equality without prejudice to the social, economic, or political status of respondents. Also, the researcher took steps to ensure that data was not falsified in the pursuit of knowledge. Finally, the researcher

recognised all of the study's contributors and gave full credit to those scholars right away. There is also a list of references attached. Significant effort was also exerted to ensure that the research was free from bias and fraudulent acts and practices.

Even though human participants are not involved in systematic literature reviews, the selection of documents and analysis needed to be done to follow some ethical principles. In light of this, great efforts have been made to guarantee that the researcher follows the highest standards for performing literature reviews at every level of the research procedure. First, because the researcher is a citizen of one of the selected SSA countries, extensive precautions were put in place to ensure that the researcher's personal perspective did not influence the results obtained. Second, steps were taken to be as comprehensive as possible while creating the search strategy for the relevant primary research. The researcher admits that using primary studies alone can be biased. In light of this, a comprehensive search technique was used to investigate all accessible primary studies that were considered appropriate and met the criteria set by the researcher, thereby avoiding publishing and search biases. Third, because the review did not have access to the participants involved in the source studies under consideration, it is necessary to assess the authors' perspectives, particularly their methodological and philosophical underpinnings. As a result, the publications were thoroughly studied to ensure that their conclusions were supported by the facts presented. Fourth, the "Preferred Reporting Items for Systematic Reviews and Meta-analyses" (PRISMA) technique was used to gather the papers, ensuring the greatest levels of rigour and quality. Lastly, steps were taken to find and cite the articles that were used in the research. This was done to avoid plagiarism.

3.7 Piloting of the study

A pilot test was conducted to fine-tune the survey instrument. According to Saunders et al. (2018), researchers who gather data using a survey instrument should do a pilot test on some participants, and these participants should come from the larger sample targeted by the researcher. Saunders further postulates that "the purpose of the pilot test is to fine-tune the questionnaire so that respondents will have no difficulty completing the questions and providing accurate responses" (Saunders, 2019, p 473). It will also assist the researcher in examining the validity of the questions as well as the likely reliability of the data obtained from various forms of questions (Saunders, 2019). Ten participants each from the student survey and the bank officials' survey were employed for the pilot trial. A sample of 10–30 individuals is deemed adequate for piloting. Other researchers posit that 12 participants for the pilot study should suffice (Van Belle, 2002), while a few others suggest 10% of the whole study sample size (Treece and Treece, 1982). As a result, the research's pilot study sample is acceptable. The Bell and Waters (2014) pilot question was used to determine the validity of the survey question. The online survey included the following question, which was submitted by the pilot research participants:

- the duration for the questionnaire;
- the clearness of the guidelines;
- which, questions were difficult or ambiguous
- the questions participant felt uncomfortable to provide answers to;
- if there had been any major topic omissions in their view;
- if the structure of the questionnaire was unambiguous and straightforward;
- "any other comments" (Bell and Waters, 2014)

Suggestions concerning the interview and survey questions were supplied by the respondents (see table 3.5 and 3.6). Some people suggested modifying or removing certain questions, while others suggested introducing a new question that wasn't in the original survey design. The final questions were prepared and delivered to the entire research sample after considering and applying the Pilot test input.

Table 3.5: Result of Pilot study for student Sample

Number of participants	**Country**	**Feedback**
3	Ghana	Statement 3 under Section B is not very clear, kindly modify
2	Ghana	Section B Has been repeated, kindly check
1	Nigeria	The meaning of FinTech should be defined to guide respondents
3	Ghana	There is no question
2	Ghana	Statement 5 under Section C requires modification, it is difficult to understand
1	South Africa	Kindly check question 5 under section C. The question is not complete
3	Ghana	There are no suggested responses to question 4 under section D

Table 3.6: Result of Pilot study Bank officials

Number of participants	Country	Feedback
3	Ghana	Please provide some options for question 4 under Section B. The question is repeated
2	Ghana	Kindly check statement three and four under Section C Has been repeated, kindly check
1	Ghana	Please modify the statement 2 under Section D. It is not clear
3	Ghana	There are no options for statement 4 under Section D
2	Ghana	Statements 3 and 4 under section D are the same. You may have to correct that

3.7 Data Collection and Analyses

A significant portion of the data used in this study was acquired through primary sources. Primary data is information gathered directly from sources. It is primarily collected for a specific research endeavour, and the researcher is the one who does so (Saunders et al. 2016). Secondary data, on the other hand, is data that has already been gathered for another reason but is being used by a researcher for interpretation and analysis (Saunders et al. 2018). Structured questionnaires and interview guides were used to collect primary data for this study. Google Forms was used to create the structured questionnaire. The link to the forms was sent to the prospective respondents through their e-mail address. The responses were received in CSV file format and converted into Microsoft Excel format. This data was then imported into SPSS and SmartPLS v.3 for analysis and interpretation. The qualitative data came from the interview session with the respondents,

who used the Zoom video conferencing platform to provide responses to the interview questions.

According to Saunders et al. (2019), data analysis involves the systematic application of statistical and/or logical techniques with the goal of describing, illustrating, summarizing, and evaluating data. There are several techniques available for analysing data. For the purposes of the quantitative analysis, three main techniques were applied. These include structural equation modelling, logistic regression, and multiple regression. Qualitative data was analysed using qualitative content analysis. Smart PLS 3 and SPSS, v. 22, were the software packages used to conduct the analysis. Because the quantitative data for the study is gathered using Google forms, the responses are directly sent into a comma-separated value (CSV) file. The CSV file was therefore extracted into a Microsoft Excel format and exported into SPSS and Smart for the data analysis process. This software has been chosen because it supports the analysis techniques stated above. For instance, SPSS was useful for undertaking descriptive and logistic regression analysis. Smart PLS was suitable for conducting the structural equation modelling analysis, whereas qualitative data analysis techniques were applied to present the qualitative data based on transcription, coding, and categorization of content and key words. The various techniques applied to analyse both quantitative and qualitative data are further discussed below.

3.7.1 Structural Equation Modelling

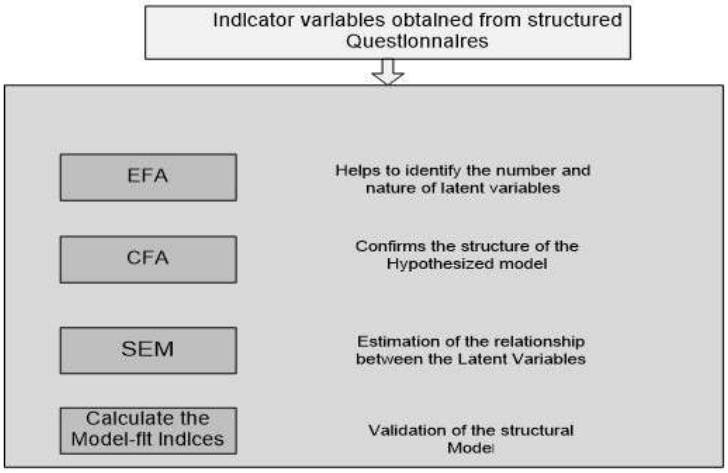
Structural equation modelling is a tool for examining structural correlations between variables. SEM is a strong statistical modelling tool that combines measurement and path models into a full covariance structure analysis framework. The SEM technique

was used to analyse research questions 1, which seeks to examine the factors influencing FinTech adoption among households and research questions 3, which examines the influence of FinTech on bank performance. The SEM technique was deemed appropriate for this objective for three main reasons. First, SEM has the ability to simultaneously examine the connection among multiple variables. Second, SEM is deemed appropriate where latent variables are used, and because the focus of the first objective is to capture the association existing between different latent variables and the dependent variable, this SEM is the best technique to apply (Jimenez and Lyer, 2016). Third, studies on FinTech adoption have mainly used SEM techniques to determine the factors influencing FinTech adoption (Jimenez and Lyer, 2016; Stewart and Jurgen, 2018). The suitability of the data for SEM analysis was investigated using factor analysis. The link between the study's variables was then investigated using correlational and path analysis. Even though a number of software packages are available to conduct SEM, the smart PLS is used in this study. The advantage of the SmartPLS over other software is that it has the potential to yield statistically significant conclusions even when small samples of data are involved (Hair et al., 2013). Using a measurement model and structural equation modeling, smart PLS software also checks the validity and reliability of the study variables. It also looks at how the independent and dependent variables are linked.

Structural equation modelling follows four main stages, as captured in Figure 3.5. First, the variables are subjected to exploratory factor analysis (EFA) in order to identify the number and nature of underlining latent factors. After the EFA stage, a confirmatory factor analysis (CFA) phase is applied to confirm the hypothesised structure of the factors. In the third phase, the SEM phase, which involves the estimation of the causal relationship

among the latent variables, is carried out. In the last step, which is often called the validation phase, a number of model-fit indices are used to test how well the model fits the data.

Figure 3.5 Steps in SEM Analysis



CFA is designed for the situation when the connections between the indicator variables and the latent factors are unknown or uncertain (Byrne, 2009). It is based on a factor analysis model, which can be given by the following set of equations (Martinez, Martinez, and Solka, 2011).

$$x_1 = \lambda_{11}.f_1 + \lambda_{12}.f_2 + \ldots + \lambda_{1d}.f_d + \varepsilon_1$$
$$x_2 = \lambda_{21}.f_1 + \lambda_{22}.f_2 + \ldots + \lambda_{2d}.f_d + \varepsilon_2 \quad (1)$$

...

$$x_p = \lambda_{p1}.f_1 + \lambda_{p2}.f_2 + \ldots + \lambda_{pd}.f_d + \varepsilon_p$$

...

$$x_p = \lambda_{p1}.f_1 + \lambda_{p2}.f_2 + \ldots + \lambda_{pd}.f_d + \varepsilon_p$$

Where: $x_i, i = 1,..., p$ represents the observed variables, $f_j, j = 1,..., d$ represents the unobserved latent variables, $\lambda_{ij}, i = 1,..., p, j - 1,..., d$ represents the factor loadings, and the error term is represented by $\lambda_i, i = 1,..., p$. The set of equations, represented by equation (1) can be written in a matrix form as follows:

$$x = \Lambda.f + e$$

Where x is represent the vector of measured variables, Λ represent the matrix of the factor loading of all the observed variables on each of latent variable; f represents the vector of factors; while e represent the vector of error terms.

For this model to hold, three main assumptions are made. First, it is assumed that the expected values or means of all the variables are equal to 0. Second there is no correlation between the error terms. Finally, the common factors, which is represented by f , has not correlation with the error terms, e .

The correlation or covariance matrix can thus be expressed as follows

$$S = \Lambda^T.\Lambda + \Psi = \Lambda^T.\Lambda + E(e.e^T) \quad (3)$$

Where: Ψ represents the diagonal matrix of the error term variance.

The variance of each of the observed variables, $x_i, i = 1,..., p$ can be expressed using the following equation

$$VAR(x_i) = \lambda_{i1}^2 + \lambda_{i2}^2 + ... + \lambda_{id}^2 + \sigma_i^2 = h_i^2 + \sigma_i^2 \quad \text{for} \quad i = 1,..., p$$

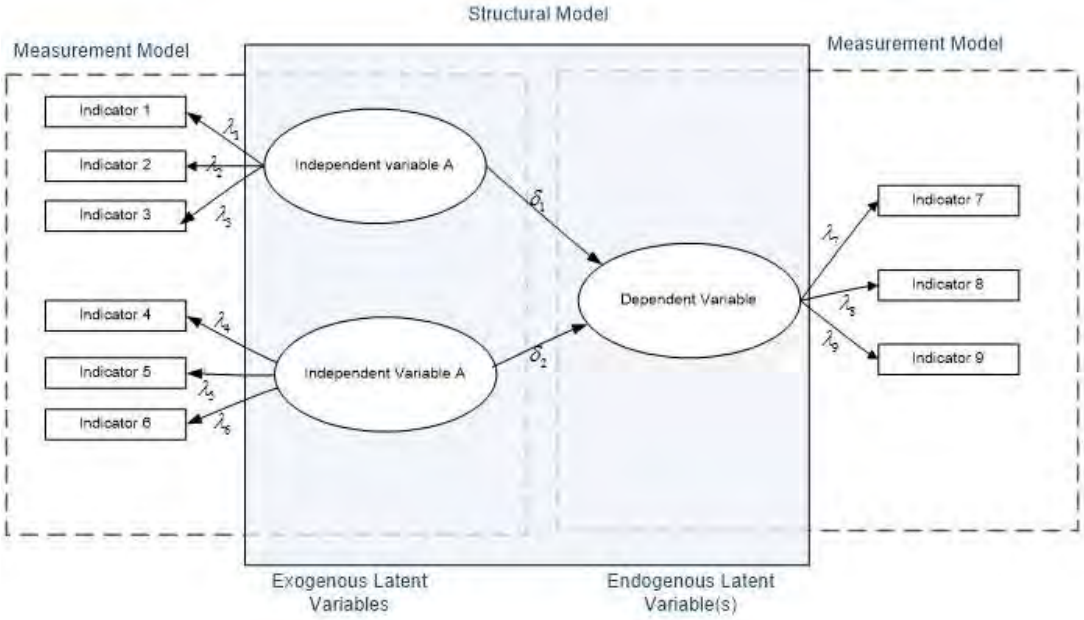
(4)

Where, $\sum_j \lambda_{ij}^2$ which is the sum of squared values of all the factor loadings, is known as

communalities, h_i^2 of the variable x_i. Also, σ_i^2 represent the variance of the error term.

The structural equation modelling (SEM) is made up of the structural model and the measurement model, as captured in Figure 3.6 below.

Figure 3.6 Diagrammatic Structural and measurement models of SEM



3.7.2 Logistic Regression

The study's second goal, determining the extent to which FinTech effects savings, investment, and borrowing, was accomplished by logistic regression analysis. Using logistic regression, the link between a categorical dependent variable and a set of predictor variables is determined. In logistic regression, the dependent variables assume two values, "Yes" or "No," which are coded as 0 and 1. In the second research goal, the dependent variables are categorical, meaning "yes" if the customer saves, borrows, or invests with FinTech and "no" if they don't.

In logistic regression, the outcome variable, which is categorical (Y), is regressed on a set of independent variables (both continuous and categorical). Y can be one of the following values: 1, 2,... G. Assuming the dependent variable is given as Y and the independent variab

Let Y be the dependent variable which is regressed on a set of p independent variables $X_1, X_2, \ldots, X_P$.

Now Let:

$X = X_1, X_2, \ldots, X_P$.

$$B_g = \begin{pmatrix} B_g \\ . \\ . \\ . \\ B_{gp} \end{pmatrix}$$

Then, the model to estimate the logistic regression with G equations is expressed as

$$\ln\left(\frac{p_g}{p_1}\right) = \ln\left(\frac{p_g}{p_1}\right) + \beta_{g1}X_1 + \beta_{g2}X_2 + \ldots + \beta_{gP}X_P$$

$$= \ln\left(\frac{p_g}{p_1}\right) + X\mathrm{B}_g|$$

Where p_g is the likelihood or probability that and individual with values $X = X_1, X_2, \ldots, X_P$. belongs to the outcome, g. This can be further expressed as

$e^{XB} = e^{\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p}$

$P_1, P_2, \ldots, P_G$. is the prior probabilities.

These equation can be observed as liner in the logits of *P,* in terms of probabilities, they appear as non-linear. Thus the nonlinear version of the equations is given as:

$$P_g = \mathrm{Pr}ob\left(Y = g \mid X\right) = \frac{e^{XB_g}}{1 + e^{XB_2} + e^{XB_3} + \ldots + e^{XB_g}}$$

By applying the rule $e^{a+b} = (e^a)(e^b)$, we can express e^{XB} as:

$$e^{XB} = e^{\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p} \quad \text{or} \quad e^{XB} = e^{\beta_1 X_1} e^{\beta_2 X_2} \ldots e^{\beta_p X_p}$$

For the purposes of interpreting the regression coefficient, we assume a dependent variable Y, which assumes binary values coded as 0 and 1, then the logistic regression equation is

expressed as

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X$$

Now, if X increases by a unit, the equation becomes

$$\ln\left(\frac{p'}{1-p'}\right) = \beta_0 + \beta_1(X+1)$$

$$= \beta_0 + \beta_1 X + \beta_1$$

The slope, β_1 can be isolated by finding the difference between the two equations as follows:

$$\beta_1 = \beta_0 + \beta_1(X+1) - (\beta_0 + \beta_1 X)$$

$$= \ln\left(\frac{p'}{1-p'}\right) - \ln\left(\frac{p}{1-p}\right)$$

$$= \ln\left(\frac{\frac{p'}{1-p'}}{\frac{p}{1-p}}\right)$$

$$= \ln\left(\frac{odds'}{odds}\right)$$

Thus, β_1 is described as the log of the odds ratio associating the odds after a one unit increase in X to the original.

The quantitative models being applied to analyse the data come with some assumptions. All the models or analysis techniques discussed above assume that there is no multicolinearity problem. A multicolinearity problem occurs when the predictor variables are very much correlated (Pallant, 2011). To overcome this problem of

multicolinearity, the Pearson Correlation Matrix was created to access the level of correlation among the independent variables. Also, the variance inflation factor (VIF) of

the independent variables was examined to ensure that there was no multicolinearity among the variables (Field, 2009). Also, because the current study is a cross-sectional one, the problem of independence of error does not apply in the case of logistic regression. Furthermore, another important assumption of SEM is the number of observations. Because structural equation modelling is a complex model that examines the relationship among different multivariate variables, the size of the observation is important to ensure unbiased estimates. Thus, it is required that for an accurate and unbiased estimate, at least 200 observations are required. In this study, an effort was made to ensure that the number of estimations exceeded 200 observations.

3.7.3 Content Analysis

In addition to the quantitative analysis, qualitative content analysis was conducted to present the qualitative data analysed. This was done to compliment the quantitative data and to answer the research question 4, which seeks to examine the regulatory responses to Fintech adoption in SSA. This was done by gathering textual data in the form of interview responses. In simple terms, qualitative data connotes any data that is not measured numerically. Qualitative data comes in the form of text and, therefore, it is not measured using fixed scales or complex mathematics and statistics (Saunders et al. 2018). Put differently, whereas quantitative analysis focuses on numbers and statistics, qualitative analysis focuses on words, descriptions, concepts, or ideas. Thus, statistical analysis techniques cannot be applied to analyse such data.

There are a number of qualitative data analysis (QDA) techniques that can be applied to describe, illustrate, summarize, and evaluate qualitative data. For the purposes

of this study, the qualitative content analysis technique will be applied to analyse the qualitative data. Qualitative content analysis is one of the QDAs designed to systematically code, categorize, and explore textual data with the view to determining the patterns and trends that exist between concepts and words, their relationships, and frequency (Pope *et al*., 2006; Gbrich, 2007). Content analysis has been identified as one the main acceptable techniques for identifying themes, ideas and words in textual data, and these themes and concepts can be applied to achieve the desired outcome of a research. It helps to make meaning of complex textual data (Karim et al., 2022).

Content analysis is chosen for a number of reasons. First, content analysis makes it possible to analyse data qualitatively and also add a quantitative touch to the analysis (Gbrich, 2007). Second, content analysis is the most common and easiest form of QDA that can be applied to evaluate patterns within phrases and words. It can also be applied in a variety of ways without many restrictions. Fourth, qualitative content analysis is highly flexible, which can be applied at low cost, at any location, at any time. Furthermore, it is one of the main QDA techniques that yields highly reliable results that can be replicated easily by other researchers (Bryman, 2004).

The content analysis was applied to analyse other documents and information obtained from websites and official releases of the central banks of the selected countries. Relevant documents in the form of records, website information, working papers, and existing databases were examined and analysed. These articles concern laws, regulations, directives, guidelines, and other regulatory information and sandboxes. By

comprehensively identifying common results among different articles, themes were developed to help answer the research questions.

Several steps were taken to ensure that the documents and information obtained were appropriate. First, these documents were examined to determine how accurate, authentic, and credible they were. Second, the completeness of the document in terms of providing adequate information on the subject of FinTech regulation was ascertained. Third, the purpose of these documents, the background of the authors or publishing authorities, as well as the scope of the documents, were examined. Using search engines like Google, a search of these relevant documents was conducted. Key words and phrases such as "FinTech," "FinTech regulation," "FinTech regulation in SSA," "RegTech," "regulatory sandboxes," and "FinTech legislation" were used to search for the relevant documents.

3.8 Summary of Methodology

This chapter was designed to provide a detailed framework for the methodology adopted for the study. A mixed method design was found to be the most suitable design to adopt. The explanatory concurrent mixed method approach was also used to present the results of the study. In addition to helping meet the objectives of the study, the mixed method approach enhances the validity of the results by providing the benefits of complementarity and triangulation.

The chapter also detailed the procedure for data collection and analysis. A structured questionnaire and an interview guide were the main tools designed to gather data. An online platform was used to gather the data for the purposes of analysis. It details

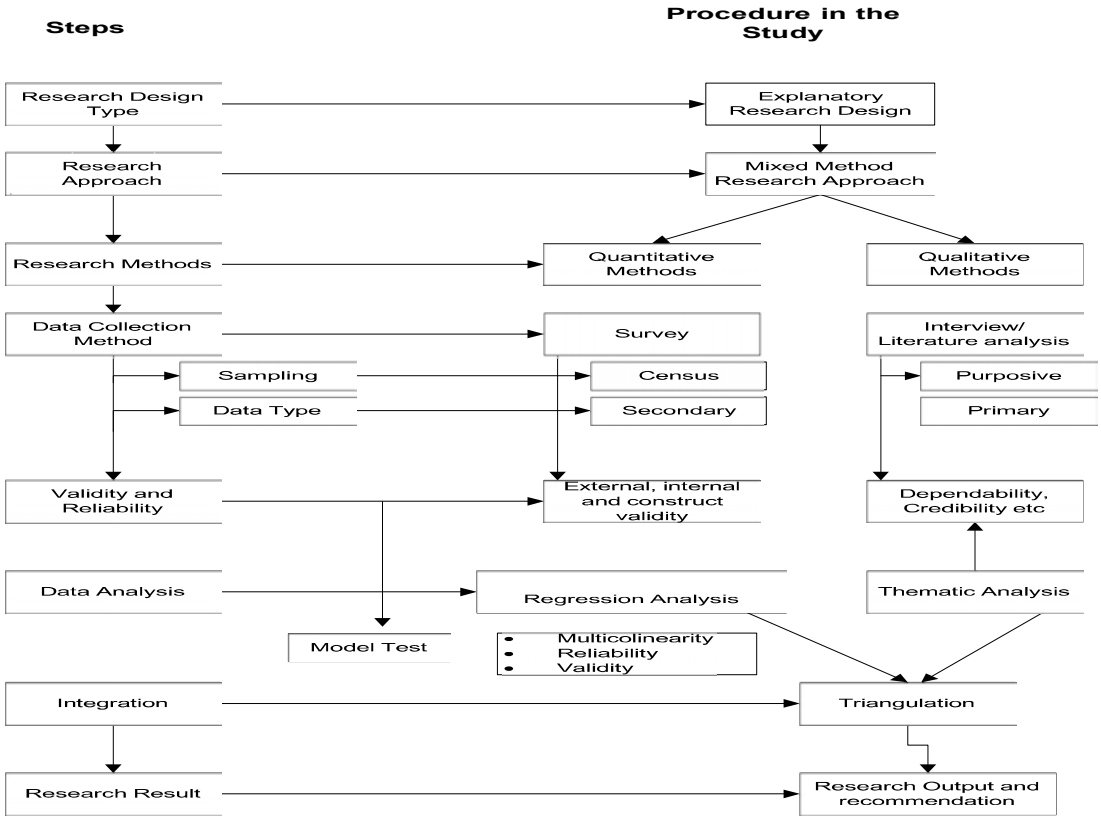
the procedure applied to gather both quantitative and qualitative data. The chapter further details how quantitative data analysis techniques such as SEM, logistic regression, and multiple regression will be applied to analyse the data. In addition, the procedure for analysing the qualitative data was spelled out.

The chapter also explained how the data was obtained from respondents. A cross-country electronic survey was undertaken with participants from Ghana, Nigeria, Kenya, and South Africa. The survey was created with Google Forms and sent to prospective respondents over a 4-month period in June and October of 2021. The Google Forms were set up to allow only one response per device to prevent the potential for repeated responses from the same participant. Because there was no motivation for potential participants to submit multiple responses using multiple devices, there was little incentive for them to do so. A diverse group of undergraduate and postgraduate students pursuing diverse programmes were recruited from Ghana Communication Technology University (Ghana), Babcock University (Nigeria), the University of South Africa (South Africa) and Kenyatta University (Kenya). These students received the link to the Google Forms questionnaire via email and WhatsApp. As stated by Topolovec-Vranic and Natarajan (2016), social media platforms such as Facebook, WhatsApp, LinkedIn, and Instagram present new avenues to recruit study participants. For example, using social media channels to attract potential study participants has a number of advantages, including worldwide access, a snowball effect, and quick dissemination (McRobert et al. 218). Students who first received the link were encouraged to forward the link to other relevant others in order to increase participation. On Google Forms, responses to the questionnaire were automatically recorded. The Research Ethics Committee of Unicaf University perused the questionnaires

and granted the study ethical clearance. The study was fully voluntary; no personally identifiable information was collected, and all responses were anonymous. All respondents agreed to take part in the study without being forced to do so.

A detailed adherence to ethical principles underpinning graduate level research was also laid down. First, ethical clearance was obtained from UREC, which is a body mandated to compressively examine the research topic, objectives, and nature of participants to ensure that there are no ethical issues. Issues about confidentiality, anonymity, and justice were also addressed. The steps and procedures for gathering, analyzing, and presenting the research data are summarised in Figure 3.7

Figure 3.7 Study steps and procedure



Source: Researcher's own construct, 2022

CHAPTER FOUR

DISCUSSION OF RESEARCH FINDINGS

4.1 Introduction to the Section

The main idea behind chapter four is to present, interpret, and discuss the study's findings. As indicated in previous sections, the motivation of this study is to assess FinTech acceptance in SSA and how FinTech has influenced consumer behaviour, traditional banks, and regulatory responses. Based on this broad aim, four specific research objectives were formulated. The first is to ascertain the determinants of FinTech adoption in SSA. The second examined the extent to which FinTech adoption affects the savings, investment, and borrowing behaviour of consumers. The third specific objective of the study is to assess the extent to which FinTech growth and development in SSA influences the performance of traditional banking institutions. The fourth and final objective is to examine how the development of the FinTech sector has impacted regulatory responses in SSA. To achieve these objectives, four countries from SSA were targeted. These four include Nigeria, Kenya, South Africa, and Ghana. These countries were selected based on factors such as availability of data, FinTech development ranking, and availability of key FinTech infrastructure. Structured questionnaires were designed and administered using the Google Form survey platform. Primary data was gathered from university students across these countries as well as selected bank staff. In addition, regulatory data, records, and documents were also gathered from various sources. Research objectives one, two, and three were analysed using quantitative techniques such as structural equation modelling (SEM), binomial logistic regression (BLR), and other descriptive statistics. Research

objective four was analysed using qualitative content and analysis. Qualitative data in the form of interviews was gathered to compliment the quantitative data.

The current chapter is organised under five main thematic areas. The first section (section 4.2) provides an explanation of the trustworthiness of the data. In this section, an effort is made to explain the data sources, the data collection process, and the accuracy of the data. In section 4.3, the validity and reliability of the research data are investigated and presented. We use both quantitative and qualitative analysis to demonstrate the reliability and validity of the data. In section 4.4, the results of the findings, including graphical and tabular illustrations, are presented. The results are presented in accordance with the research objectives and hypotheses formulated in chapter one of this study. In section 4.5, the findings are evaluated and discussed. Section 4.6 concludes the chapter by presenting the summary.

As stated earlier, two sets of populations of interest were considered. The first consists of the student population, whereas the second comprises bank officials. Overall, the online questionnaire targeted 1,200 student respondents across four countries. Of this number, a total of 879 completed and submitted the online survey using Google Forms. However, 61 of the responses obtained were classified as unusable and were discarded as the respondents could not complete important sections of the online questionnaire. Thus, 818 responses were received and analyzed, constituting a 68.2% response rate.

A total of 300 bank officials were targeted, and of these, 132 successfully completed and returned their questionnaires, which were delivered using Google Forms. Though the

response rate from the bank respondents was just 44%, the figure is considered good given that online questionnaires have a very low response rate (Saleh and Bista, 2017).

4.2 Trustworthiness of Data

Data is raw facts that are analysed to make sense for a specific audience. In typical academic research, the data can be quantitative or qualitative. In this study, both quantitative and qualitative data were collected. The quantitative data was gathered using structured research questions. Before the questionnaires were designed, extensive literature on FinTech innovation, its adoption, and its impact on traditional banks and regulatory responses were thoroughly reviewed. The extensive review was helpful in identifying the types of questions and constructs to formulate. For instance, the study relied on theories such as the Actor-Network Theory (ANT), the TAM, EPAM, TRA, UTAUT, and the Financial Mediation Theory. These theories have been applied to assess the adoption and use of new technology and its economic and social impact, and therefore provide the needed constructs and models for the current study. Existing tried and tested constructs were adopted from these theories and other relevant theories to support the design of the questionnaires. In addition to these theories, existing empirical models and constructs were used and modified to fit the research problem at hand.

With the exception of the demographic data and a few other questions, all questions were designed using a five-point likert scale format. The likert scale format was deemed suitable because it afforded the researcher the opportunity to present the analysis using quantitative techniques. Given that the targeted participants were scattered across four countries (Ghana, Nigeria, Kenya, and South Africa), it was practically impossible to

gather data using the face-to-face approach. The researcher, therefore, relied on online survey platforms for the collection of the data. Among the various platforms, Google forms were adopted. Google Forms is a free platform that provides a convenient and easy way to reach participants across the globe. The e-mail addresses of possible participants were obtained, and the link to the online questionnaire was shared. In addition, the link was shared on Whatsapp groups for interested participants to respond. The responses were obtained and retrieved from the Google forms in Comma-Separated Value (CSV) format. This format allows responses to the questionnaire to be saved in a structured format for onward export into excel and other data analysis software programs.

The CSV file format was first changed into the Excel format for easy access. This was then transported into SPSS version 22 and SmartPLS 3 programs for the data analysis. The data in SPSS was recoded to fit the requirements of the study and its objectives. For stance, the Likert scale format questions were coded as: "1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = strongly disagree." In addition, binary data was coded in such a way that binomial logistic regression could be applied. Care was taken to ensure that in exporting the data, all data points were transported. After the data was transported into these programs, an effort was made to thoroughly clean it for accuracy, reliability, and validity. As an example, responses that were judged to be incomplete (because they didn't have answers to important questions) were discarded.

With regards to the qualitative data, trustworthiness is extremely essential to guarantee the credibility, reliability, and validity of the findings. Trustworthiness involves a critical assessment of the accuracy of the study data and its findings. As far as this study

is concerned, qualitative data was obtained from interviews conducted with bank officials, existing databases, company reports, websites of key regulators and government agencies, as well as peer-reviewed journal articles and working papers.

Information about all the regulations of various FinTech models (e-money or mobile payment, peer-to-peer lending, crowdfunding, InsurTech, crypto-currencies, etc.) was obtained directly from the websites of the regulators of these platforms. In addition, countries with FinTech offices and websites were consulted. Again, the various laws regarding FinTech regulations in the selected countries were examined. Furthermore, existing research articles published in Scopus-indexed journals, Science Direct, and other peer-reviewed journals were examined. Even though there are various FinTech models that are currently operating in SSA, data collection is centred on six main FinTech models, which include e-money or mobile payment, peer-to-peer lending, crowdfunding, InsurTech, crypto-currencies, etc. These models were selected because they are the most common forms of FinTech models currently used by consumers in SSA.

Various steps were taken to enhance the trustworthiness of the qualitative data. The use of document analysis for the presentation of the qualitative data meant that critical documents that were related to the objectives and purpose of the research ought to be selected. Document analysis involves skimming through various documents, examining content, and interpreting it using techniques such as matrix analysis and checklists. Since the qualitative document analysis was done to answer the fourth research question, which focuses on FinTech regulation within SSA, relevant documents in the form of records, website information, working papers, existing databases, and journal articles were

gathered. A number of steps were taken to ensure that the document obtained was appropriate for meeting the objectives of the study. First, these documents were examined to determine how accurate, authentic, and credible they were. Second, the completeness of the document in terms of providing adequate information on the subject of FinTech regulation was ascertained. Third, the purpose of these documents, the background of the authors, as well as the scope of the documents were examined.

Using search engines like Google, a search of these relevant documents was conducted. Key words and phrases such as FinTech, FinTech regulation, FinTech regulation in SSA, RegTech, regulatory sandboxes, and FinTech legislation were used to search for the relevant documents. After screening these documents for irrelevant content, ambiguous methodology, unavailability of critical information, and unclear presentation of findings, a total of 12 documents or articles were considered for the analysis. To enhance the trustworthiness of literature information, steps were taken to ensure that the highest levels of rigour and quality were maintained. As a result, the "Preferred Reporting Items for Systematic Reviews and Meta-analyses" (PRISMA) (Moher et al., 2009) approach is provided as a guide for document gathering and analysis.

4.3 Reliability and Validity of Data

The quality and acceptability of a research finding hinges on its reliability and validity. Whereas reliability explains the consistency of measurement, "validity explains the extent to which a data collection instrument measures what it purports to measure (Saunders et al. 2018). Reliability and validity are at the core of quality research and its findings, and as a result, an effort was made in the current study to improve the quality of the research process. In this section, the steps taken to enhance the validity of the study are

thoroughly explained. We describe these concepts and explain the steps taken in each case to ensure that the quality of the findings is accurate and can be relied upon to make credible policy recommendations and conclusions.

4.3.1. Reliability of the Study

In the research process, the issue of reliability is extremely important. According to Nunnally (1978), reliability involves consistency in measurement or stability of measurement under different conditions. Put differently, a study is regarded as reliable if the same result is obtained irrespective of the time period, the situation, and the setting. According to Drost (2011), reliability can be investigated using various techniques and measures. However, the two most commonly used techniques are the "test-retest approach" and the "internal consistency approach." Test-retest reliability seeks to assess how stable the measurement is by administering the same instrument to the same respondents at different periods and determining the extent to which the two sets of responses correlate. This approach has been used extensively by other researchers, but this study did not apply it because of the time constraints in gathering the data. Also, since the data collection was done online, the researcher was not convinced that the same people would be ready and willing to answer the same set of questions at different times. The most common reliability measure, which is often used in business and other social science research, is the internal consistency measure. Internal consistency is concerned with the reliability of the measurement instrument and how the items measure a given behaviour, attitude, or construct. This measure seeks to assess the internal consistency of the instrument by estimating the average interrelations among the items, which is a tougher measure of a specific construct. The most popular measure that is often applied to test the internal

consistency is the coefficient alpha, popularly referred to as Cronbach's Alpha. In this study, the reliability of the instrument was tested using Cronbach's alpha. This technique was chosen because it is the most common test of reliability and can easily be estimated using statistical software such as SPSS and SmartPLS 3. The Cronbach's alpha was estimated by applying the formulae:

$$\alpha = \frac{N.\bar{C}}{\bar{V} + (N-1).\bar{C}}$$

Where:

"N=the number of items measuring the construct"

"$\bar{C}$ = indicate the mean or mean covariance existing between the item-pairs"

$\bar{V}$ = the overall average variance

The value of the (Cronbach's alpha) helps to ascertain whether the construct is reliable (there is internal consistency between the items) or not. The general "rule of thumb" is that the Cronbach's Alpha must exceed 0.7 to ensure reliability of the construct (Pallant, 2011). Generally, the degree or level of internal consistency in the measurement is captured in table 4. 1.

Table 4.1 Cronbach Apha and Levels of Internal Consistency

Cronbach's Alpha	**Level of internal consistency**
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	unacceptable

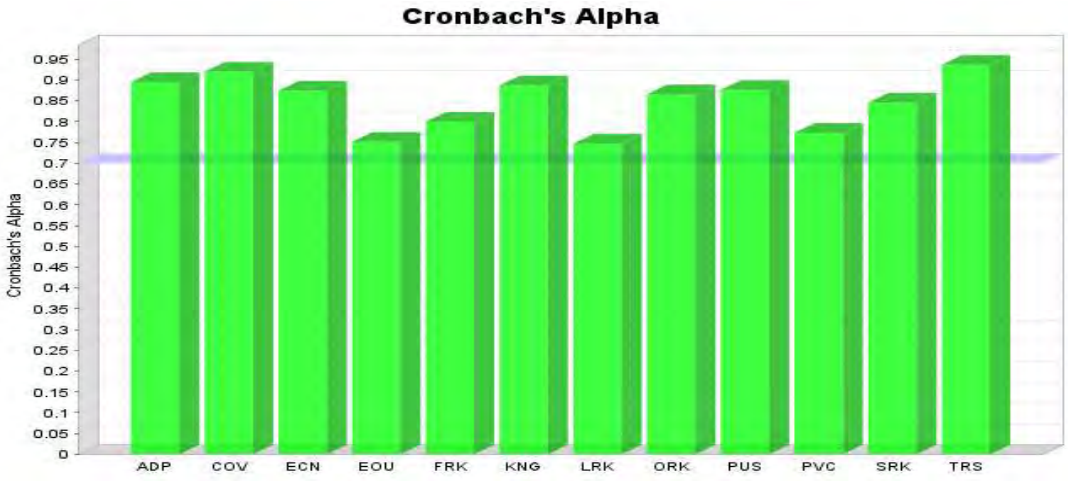
This rule of thumb is supported by Palant (2011) and Nunnally (1978), who explain that Cronbach's alpha statistic of 0.7 and more demonstrate good internal consistency of the items, whereas Cronbach's alpha values of below 0.7 indicate poor internal consistency. The result of the Cronbach's alpha estimates is shown in Table 4.2. The estimation of the Cronbach's alpha was done using SmartPLS software. From the result, it is observed that the Cronbach's alpha values for all the constructs range from 0.765 to 0.933, which suggests that they exceed the minimum threshold value of 0.7. (See Figure 4.1). Put differently, based on the rule of thumb, five of the constructs have excellent internal consistency, three have good internal consistency, and two have acceptable internal consistency. Based on the output of the analysis, the researcher can confidently indicate that the items measuring these constructs are internally consistent.

Table 4.2: Test of reliability with Cronbach's Alpha

Construct	**Number of Items**	**"Cronbach's Alpha"**
Knowledge/Awareness of FinTech (AWN)	4	0.901
Perceived Usefulness (PUS)	4	0.891
Ease of use (EOU)	2	0.765
Economic Benefit (ECB)	3	0.879
Convenience (COV)	3	0.933
Financial Risk (FRK)	3	0.816
Security Risk (SRK)	3	0.856
Legal Risk (LRK)	3	0.771
Operational Risk (ORK)	3	0.876
Privacy (PVC)	3	0.816
Trust (TST)	4	0.948
Adoption (ADP)	4	0.902

Source: Researcher's Own Construct, 2021.

Figure 4.1: Demonstration of Cronbach's Alpha values exceeding the recommended minimum



Key: *FinTech adoption* ***(ADP),*** *Economic Benefits (**ECB**), Perceived Usefulness (**PUS**), Ease of Use (EOU), Convenience (**CVN**), Financial Risk (**FRK**), Legal Risk (**LRK**), Operational Risk (**ORK**), Security Risk (**SRK**), and privacy concerns (**PVC**), Knowledge and Awareness (**AWN**) and Trust (**TRT**)*

Source: Researcher's own construct, 2022

4.3.2 Validity of the Constructs

In addition to the effort made to enhance the reliability of the study using internal consistency measures, an effort was also made to determine and, if possible, improve the validity of the study, since a study may be reliable but not necessarily valid. Drost (2011) explains that validity is concerned with how well a given instrument measures what it purports to measure. For instance, if an IQ test is conducted, validity is interested in finding out how well the test measures intelligence. In the same way, if a set of items is measuring FinTech adoption, the guarantee that it is actually measuring FinTech adoption and not something else can be assessed by applying some validity tests.

Drost (2011) generally categorises validity into three categories: statistical conclusion validity; construct validity; and external validity. In statistical conclusion validity, the relationship between the variables is assessed to determine the feasibility of

the result. Thus, if the correlation or relationship is deemed to be unrealistic or violates popular theories, then the researcher must take steps to investigate the validity of the instrument. The second is internal validity, which considers whether the relationship between variables is what it is and whether there are no confounding variables or factors influencing the relationship. Construct validity is the process of figuring out how well the constructs are made to measure a certain behaviour or attitude. Among the various measures of construct validity, two commonly stand out. These are convergent validity and discriminant validity (Drost, 2011).

External validity assesses the extent to which a research result can be generalised to cover other populations, times, and settings. For instance, if the findings of a research work conclude that there is a strong relationship between X and Y, then external validity will want to determine the extent to which the relationship can be applicable to different people, settings, and times. The current study gathered enough data from the student population to conclude that the findings can be generalised to cover other student populations. However, the findings cannot be generalised across different non-student populations because the main target population was students.

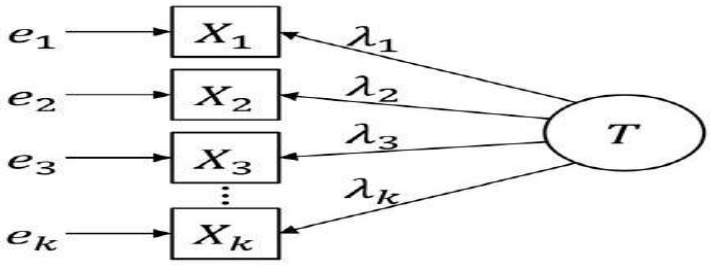
In this study, a number of steps were undertaken to ensure that the instrument was valid and that it was measuring the intended underlying constructs. First, enough data was gathered from the population of interest to improve its external validity. Thus, we can confidently apply the results of the findings to different university students across SSA. Second, the researcher adopted tried-and-tested instruments from existing authors in designing the research instrument. Given that developing an instrument from scratch is

laborious and very costly, existing instruments with proven reliability and validity were chosen for this research (Kimberlin & Winterstein, 2008). Through a thorough literature review, well-known constructs and the items measuring FinTech adoption and other constructs were adapted to fit the current study. In addition to the various actions taken to improve the validity of the instrument and the result of the study, some statistical measures of validity were also applied. Specifically, discriminant validity and convergent validity were used to check the validity of the constructs that were used.

4.3.2.1 Discriminant Validity

"Discriminant validity is the extent to which constructs are different from each other" (Saunders et al. 2018). It shows the lack of association among constructs that should not be related theoretically. Thus, if two constructs are not supposed to be related and if it is indeed tested statistically to be so, then there is discriminant validity (Sperry, 2004). The discriminant validity of the constructs in this study was assessed using the Average Variance Extracted (AVE). The AVE is estimated by dividing the sum of the squared component loadings for each construction by the sum of the component loadings plus the sum of the error variance. Variance (Fornell and Larcker, 1983). For instance, if a latent variable, T, is measured by X items, then the model is represented by Figure 4.2, where are the factor landings and are the error terms.

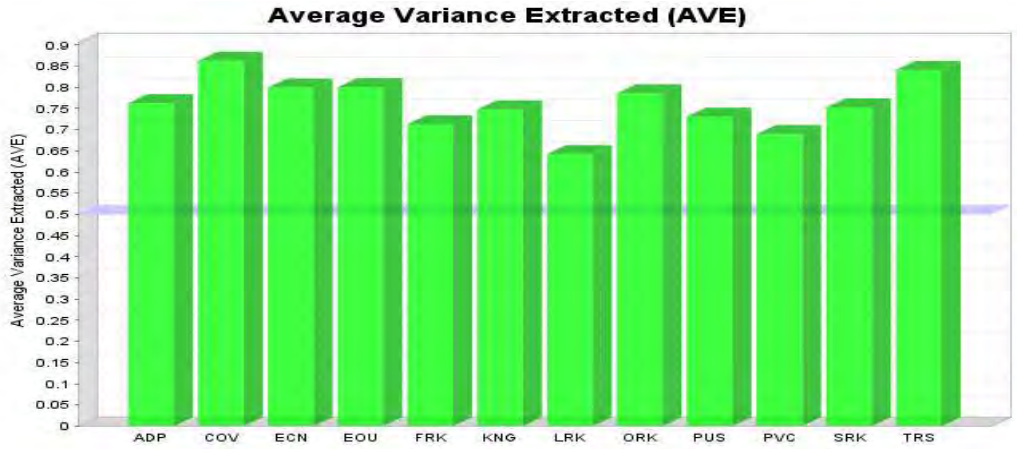
Figure 4.2 Latent variables and their measurements



The AVE is calculated as follows:

$$AVE = \frac{\sum_{i=1}^{k} \lambda^2_i}{\sum_{i=1} \lambda^2_i + \sum_{i=1}^{k} Var(e_i)}$$, where "*k* is the number of items" on a particular construct, λ_i is the factor loading of item i, and $Var(e_i)$ is the variance of the error terms associated with each of the items, *i*. Fornell and Larcker (1981) have posited that AVE values of 0.5 and above indicate good discriminant validity whiles those below 0.5 suggest poor discriminant validity of the construct. The result of the AVE for each of the constructs is shown in Figure 4.3.

Figure 4.3 Average Variance Extracted (AVE) for study constructs.



Key: *FinTech adoption* ***(ADP),*** *Economic Benefits (**ECB**), Perceived Usefulness (**PUS**), Ease of Use (EOU), Convenience (**CVN**), Financial Risk (**FRK**), Legal Risk (**LRK**), Operational Risk (**ORK**), Security Risk (**SRK**), and privacy concerns (**PVC**), Knowledge and Awareness (**AWN**) and Trust (**TRT**)*

Source: Researcher's own construct, 2022

From the results captured in Figure 4.4, the AVE for each of the constructs ranges from 0.63 to 0.87, which shows that the minimum value of AVE needed for the constructs to be valid was obtained in all cases. We can, therefore, conclude that the requirement for

construct and discriminant validity was achieved.

Another way of assessing the discriminant validity of the construct is to use the inter-scale correlation among the variables and compare them with the AVE. Discriminant validity is achieved when there is no significant relationship or correlation among the constructs. To verify this, the inter-scale correlation between the constructs is compared to the AVE values. According to Fornell and Larker (1981), this is estimated by taking the square root of the AVE for each of the constructs and comparing the same with the association among the variables. If the former values are greater than the latter, then discriminant validity is achieved, which suggests that there is no significant correlation among the study constructs. The estimation of discriminant validity using the inter-scale correlation approach is shown in Table 4.3.

Table 4.3: Discriminant validity of Constructs (Correlation and Square root of AVE)

	PUS	ADP	CVN	ECB	EOU	FRK	AWN	LRK	ORK	PVC	SRK	TRT
PUS	**0.864**											
ADP	0.607	**0.877**										
CVN	0.652	0.622	**0.934**									
ECB	0.742	0.675	0.691	**0.898**								
EOU	0.774	0.460	0.596	0.715	**0.900**							
FRK	0.426	0.291	0.468	0.419	0.410	**0.852**						
AWN	0.645	0.408	0.506	0.536	0.597	0.429	**0.878**					
LRK	0.298	0.191	0.365	0.376	0.302	0.659	0.365	**0.816**				
ORK	0.283	0.212	0.317	0.353	0.326	0.349	0.244	0.464	**0.886**			
PVC	0.481	0.544	0.487	0.604	0.525	0.295	0.389	0.334	0.523	**0.836**		
SRK	0.279	0.199	0.326	0.279	0.282	0.632	0.394	0.737	0.222	0.120	**0.878**	
TRS	0.447	0.511	0.414	0.512	0.535	0.252	0.371	0.194	0.494	0.782	0.034	**0.925**

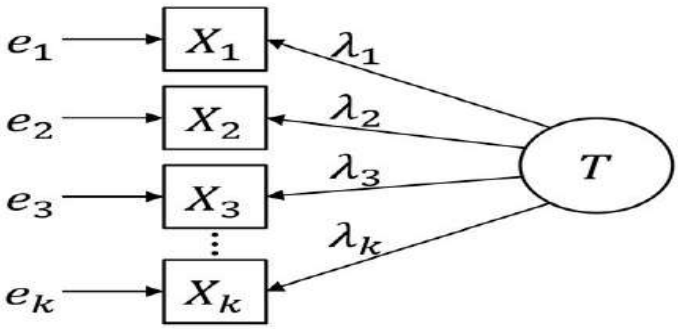
"FinTech adoption (ADP), Economic Benefits (ECB), Perceived Usefulness (PUS), Ease of Use (EOU), Convenience (CVN), Financial Risk (FRK), Legal Risk (LRK), Operational Risk (ORK), Security Risk (SRK), and privacy concerns (PVC), Knowledge and Awareness (AWN) and Trust (TRT)"

Source: Researcher's own Construct, 2022

The square root values of the AVE are indicated in bold letters in Table 4.3. These values ranges from 0.816 to 0.932. The computed values in all the columns are higher when compared with the correlation values found in each column and row. Thus, per the rule of thumb by Fornell and Larker (1981), the requirement for discriminant validity was met.

4.3.2.2 Convergent Validity

Convergent validity of the constructs was also evaluated be examining the factor loadings, which is represented by lambda (λ). Given the model:



If a latent variable, T is measured by X items, then $\lambda_1, \lambda_1 ..., \lambda_k$ are the factor loading. These factor loadings indicate the extent to which each of the items contribute to the latent variable. According to Hair et al. (2014), a factor loading of 0.7 and above indicates acceptable measure of convergent validity. Again, in Table 4.4 the factor loadings are captured, and it can be observed that all the items loaded adequately on their respective constructs.

Table 4.4 Factor Loadings

Constructs	**Factor loadings (λ**
Adoption (ADPT)	
• ADP1	**0.889**
• ADP2	**0.922**
• ADP3	**0.882**
• ADP4	**0.795**
FinTech Knowledge (KNG)	
• AWN1	**0.857**
• AWN2	**0.883**
• AWN3	**0.869**
• AWN4	**0.849**
Perceived Benefit	

• PUS1	**0.795**
• PUS1	**0.836**
• PUS1	**0.924**
• **PUS4**	**0.860**
Ease of Use (EOU)	
• EOU1	**0.879**
• EOU2	**0.910**
Convenience (COV)	
• CVN1	**0.929**
• CVN2	**0.907**
• CVN3	**0.950**
Financial Risk (FRK)	
• FRK1	**0.777**
• FRK2	**0.841**
• FRK3	**0.909**
Security Risk (SRK)	
• SRK1	**0.847**
• SRK2	**0.887**
• SRK3	**0.752**
Legal Risk (LRK)	
• LRK1	**0.814**
• LRK2	**0.873**
• LRK3	**0.901**
Operational Risk	
• ORK1	**0.894**
• ORK2	**0.871**
• ORK3	**0.895**
Privacy (PVC)	
• PVC1	**0.847**
• PVC2	**0.887**
• PVC3	**0.752**
Trust (TRS)	
• TRS1	**0.915**
• TRS2	**0.912**

• TRS3	**0.919**
• TRS4	**0.922**
Economic Benefit	
• ECB1	**0.878**
• ECB2	**0.897**
• ECB3	**0.907**

***"Key**: FinTech adoption (ADP), Economic Benefits (ECB), Perceived Usefulness (PUS), Ease of Use (EOU), Convenience (CVN), Financial Risk (FRK), Legal Risk (LRK), Operational Risk (ORK), Security Risk (SRK), and privacy concerns (PVC), Knowledge and Awareness (AWN) and Trust (TRT)"*

Source: Researcher's own construct, 2022

Aside from the quantitative measures of validity and reliability discussed above, there are other ways employed in this research to enhance the validity of the instrument and the outcomes in general. First, based on extensive literature, the appropriate constructs and their measurements were chosen. These questions are adapted from well-known constructs that have been tried and tested for their reliability and validity. Second, the right methodology was employed. Where it was necessary to employ SEM to test the hypotheses, it was used, and when it became necessary for binary logistic regression to be employed to analyse the data, it was used. This was done to ensure that the result churned out was free from systematic error. Third, the right sample size was selected to match the type of quantitative analysis that needed to be conducted. Finally, respondents responded to the questionnaire without being coerced by the researcher. In fact, the majority of the respondents completed the questionnaire online, and therefore, the researcher could not possibly influence the responses or answers they gave to the questions. Furthermore, all possible threats to the validity and reliability of the constructs were identified and resolved. For example, a lot of work was put into making sure the questions were clear and easy to

understand and answer. Also, the questionnaires were designed so that the instructions were clear and easy to follow.

The researcher was not oblivious to the fact that errors are likely to surface and affect the quality of scientific outcomes. In view of this, an effort was made to ensure that possible errors are minimised as much as practicable. When left unchecked, these errors could affect the validity and reliability of the study findings. Allchin (2001) has classified the errors into types 1, 2, 3, and 4 errors. In a type one error, "the null hypothesis is rejected even though it is true." In type two errors, "the researcher fails to reject the null hypothesis when, in fact, it should be rejected." Put differently, when the researcher fails to reject the null hypothesis when the data indicates that it should be rejected, then a type two error is said to have occurred. In type three errors, the null hypothesis is rejected for the wrong reasons. In other words, even though the null hypothesis has been rejected based on the data, the reason for rejecting it in favour of the alternative hypothesis is wrong. When such a situation happens, it is said that a type three error has occurred. In type four errors, we fail to reject the null hypothesis accurately, but the interpretation offered is factually inaccurate. To ensure that these errors are minimised as much as practicable, a number of steps have been taken. First, care was taken in interpreting the findings as a comprehensive review of the existing studies was done to ensure the interpretation was in tandem with the results obtained. Second, the researcher ensured that the data obtained from respondents did not contain much missing data to compromise the quality of the data. Lastly, all statistical tests were done by making sure that the assumptions on which they were based were not violated.

4.4 Results and Findings

After establishing the trustworthiness of the data as well as the reliability and validity of the measuring survey data, this part of the presentation captures the findings, including the graphical and tabular presentation of the results. To bring clarity to the presentation of the findings, the results are presented based on the four research questions. The results are captured without comprehensive discussion and interpretation in this section. The complete interpretation and discussion are done in subsequent sections.

4.4.1 Analysis of the factors influencing the adoption of FinTech in SSA

The first research questions sought to find the main drivers and inhibitors of FinTech adoption in SSA. The presentation is done by first presenting the background characteristics of the respondents, which include age, sex, educational level, income level, etc. The result of the demographic characteristics is followed by the descriptive statistics of the variables, which describe the "mean, standard deviation, minimum and maximum" measures of the main constructs. This is also followed by the analysis of the respondent's view, knowledge, and usage of FinTech products. To test the hypothesis under this objective, the main assumptions and requirements for structural equation modelling are presented. Finally, the results of the SEM analysis done with SmartPLS 3.0 are presented using tables and graphs.

4.4.1.1 Demographics of Respondents

This section is designed to present the various demographic details and other general information about the student sample. These students were targeted because they have some understanding of the FinTech ecosystem and are regular users of these FinTech platforms. The first section of the online questionnaire (Section A) has questions that elicit

the demographic and other general characteristics of the respondents. These questions concerned sex, age, income, educational background, and employment status. In Table 4.5, a summary of the respondent's age, gender, race, and education is given. The information given is based on a valid sample of 818 participants from four SSA countries.

Table 4.5 Demographic Characteristics of Student Respondents (818)

Variable	Categorization	Frequency	Percentage
Gender	Male	438	53.5%
	Female	380	46.5%
Age group	25 and below	238	29.1%
	26-35	431	52.7.0%
	36-45	138	16.9%
	Above 45	11	1.3%
Education	Diploma/Certificate	11	1.3%
	First Degree	258	31.5%
	Second degree	478	58.4%
	Terminal Degree	71	18.7%
Income	$100-$500	485	59.3%
	$501-$1000	243	29.7%
	$1001-$2000	33	4.0%
	$2001-$3000	23	2.8%
	Above $3000	7	0.9%
	No response	27	3.3%
Country	Ghana	241	29.5%
	Nigeria	212	25.9%
	Kenya	175	21.4%
	South Africa	190	23.2%
Employment status	Employed	546	66.7%
	Unemployed	272	33.3%

Source: Research Data

The result is analysed using SPSS V.22. From the results captured in Table 4.5, it is observed that out of the 818 respondents, 438 (53.5%) are males, while the remaining

46.5% are females. Based on this result, we can conclude that more males responded to the questionnaires than females did. However, the male respondents don't significantly dominate the sample chosen, and therefore, we can infer that the sample is not significantly skewed as far as gender is concerned. The second question from the online questionnaire sought to find out the age of respondents. This question was deemed necessary because age has been recognised as significantly affecting the acceptance of technology and, for that matter, FinTech. To obtain the age distribution of the respondents, they were asked to provide their age in years. However, the age variable was also categorised into age groups using a 10-year interval as captured in Table 4.5. This was done using the recoding feature in SPSS. From the results obtained, it is seen that the majority of the respondents are between the ages of 26 and 35. This age group constitutes 52.7% of the total valid sample. Those within the age groups of 36 and 45 also constitute 16.9% of the total sample size, whereas those under the age of 25 constitute 30.4% of the total valid respondents. It was further observed that respondents who are over the age of 45 constitute only 1.3% of the sample. It is clear from the age grouping of the respondents that those between the ages of 26 and 35 dominate the sample of respondents. This is not surprising given that the study significantly focused on postgraduate students.

The third question under section A of the questionnaire also asked participants to indicate their current level of education. From the results shown in Table 4.1, it is observed that the majority of the respondents, constituting 58.4% of the sample, are pursuing their second degrees; 1.3% are offering diploma and certificate related programs; and 31.5% are pursuing their second degrees. The remaining 8.7% of the sample are pursuing terminal degrees.

The fourth question from the demographic section of the questionnaire sought to know the monthly income of the respondents. The result, as shown in Table 4.1, indicates that the majority of the respondents earn between $100 and $500 per month. This constitutes 59.3% of the total sample. In addition, 29.7 percent of those sampled earn between $501 and $1,000. Approximately 1% of the respondents earn more than $3000 a month, while 3.3% of the respondents chose not to respond to this question.

The final question under that section of the questionnaire elicited information regarding the employment status of the respondents. As expected, the result shows that the majority of the students are unemployed. Out of the valid sample of 818, it is observed that 546 (66.7%) are employed, while the remaining 272 (33.3 %) are unemployed. Even though most of the people in the sample are students, it is clear that majority of them also work in addition to their studies.

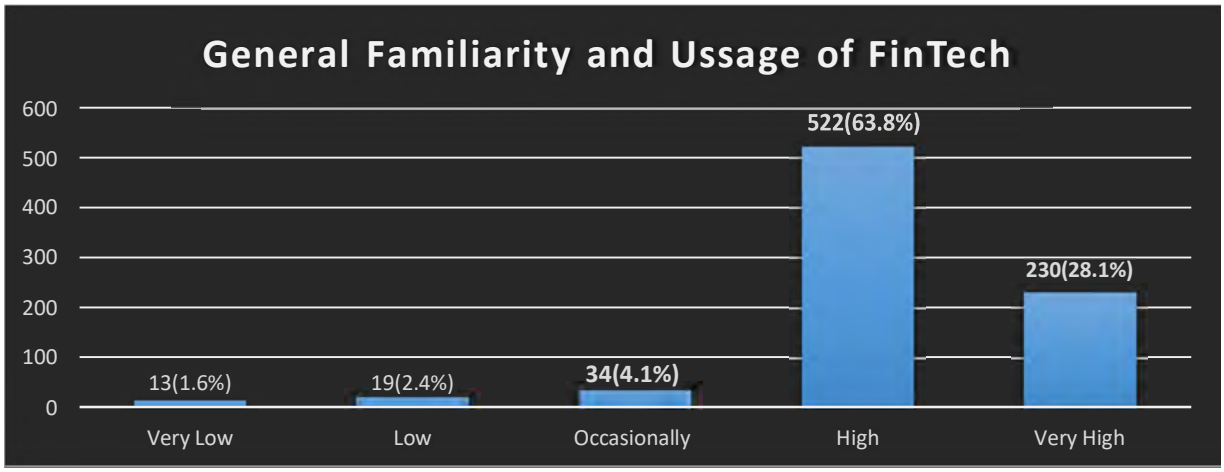
4.4.1.2 Respondents' Knowledge, understanding and Usage of FinTech Services

In section B of the questionnaires for students, people were asked what they knew about FinTech and platforms related to FinTech. One of the initial questions has to do with a respondent's knowledge of FinTech. This question was significant because it is the basis for determining how well respondents are able to respond to questions relating to FinTech and its related concepts. The question was framed using a "5-point Likert scale" where 1 represented very low knowledge, 2 = low knowledge, 3 = occasionally, 4 = high, and 5 = very high. Figure 4.4 shows the responses obtained from the respondents. Out of the 818 valid responses, it was observed that 230 (28.2%) have very high knowledge of the concept of FinTech, 63.8% have high knowledge of the concept, and 4.1% of the respondents have

occasional or moderate knowledge of the concept. However, 19 (2.4%) and 13 (1.5%) have low and very low knowledge about the concept of FinTech, respectively.

From the results above, it can be concluded that over 90% of the respondents can be classified as "ardent participants" within the FinTech ecosystem who are familiar with FinTech services, whereas 4.1% are categorised as "occasional participants." Only a little more than 1.5% of those who answered said they rarely know about or take part in FinTech. The result provides assurance that a significant number of the respondents have some sort of knowledge about the concept of FinTech. This result doesn't come as a surprise, since most students are young and know a lot about new technologies and innovations.

Figure 4.4 Familiarity with FinTech



Source: Researcher's own construct, 2022

The result above is important for the current study because individuals or consumers who are highly familiar with innovative products are likely to value their usefulness and have a better attitude and acceptance towards them (Belanche et al., 2019). However, those with little knowledge or familiarity with the concept may rely on the opinions and views of others to make decisions regarding the adoption and use of such

products (Venkatesh & Davis, 2000). Thus, the responses obtained from this question have a significant influence on the way consumers perceive and adopt FinTech services.

4.4.1.3 Level of awareness

There are a variety of FinTech products and services currently being used across the world and in SSA. These FinTech products and services are often described as FinTech models. Some of these products/models include Money Transfer and Payment (MTP), Equity Crowdfunding (ECF), Crypto-Currencies (CRC), Robo-Advisors and Asset Management (RAD), Peer-to-Peer lending (P2P), and InsurTech (IST). Some questions were asked and responses elicited to appreciate the knowledge of respondents regarding these products. Respondents were required to indicate the extent to which they knew these products using a "five-point Likert scale," which ranges from 1 (very low knowledge) to 5 (very high knowledge). In Table 4.6, the mean, standard deviation, and the highest and lowest values are used to describe the responses.

Table 4.6 Descriptive Statistics of Knowledge of FinTech Services

Variables	N	Min	Max	Mean	SD
Money Payment and Transfer (MPT)	818	1	5	4.60	0.437
Equity Crowdfunding (ECF)	818	1	5	3.52	1.225
Crypto-Currencies (CRC)	818	1	5	3.34	1.186
Robo-advisors and Asset Management (RAD)	818	1	5	3.15	1.160
Peer to peer lending (P2P)	818	1	5	3.45	1.444
Insurance (IST)	818	1	5	3.62	1.407

Scale (mean) 0 – 2.5 = low; 2.51 – 3.5 = Average and 3.51 and above = High

In Table 4.6, the knowledge of respondents regarding six FinTech products was elicited. The result is presented using descriptive statistics such as the “mean, standard deviation, minimum and maximum values”. The value of the mean determines whether their knowledge of the product is low, high, or neutral (neither low nor high). From the result, it can be observed that mobile payment has a mean of 4.60, which is considered high. Put differently, the mean rank of 4.6 out of a maximum value of 5 indicates that, on average, consumers have high/sufficient knowledge about money payment and transfer FinTech. However, on average, respondents have average knowledge about the other FinTech products such as Equity Crowdfunding (Mean = 3.52, SD = 1.225), Crypto-currencies (Mean = 3.34, SD = 1.18), Robo-Advisors and Asset Management (Mean = 3.15, SD = 1.16), Peer to Peer Lending Platforms (Mean = 3.45, SD = 1.44), and InsurTech (Mean = 3.62, 1.407).

The responses show that money transfer and payment (MTP), which has the highest mean of 4.6, is the dominant FinTech service among the respondents. This result is not surprising as various studies on FinTech have observed that the most common FinTech service in Africa is mobile payment and transfer FinTech. The current result compares favourably with the findings published through the Global FinTech adoption index as presented in Figure 4.5.

Figure 4.5: FinTech awareness level among key FinTech models.

Source: Global FinTech Adoption Index 2019

It can be observed from that report that only 4% of consumers are unaware of mobile transfer and payment FinTech, compared to 29% who are unaware of budgeting and financial planning FinTech. The implication of this result is that FinTech firms and MNOs will have to do more to make consumers aware of the other FinTech models that are currently available to consumers aside from the mobile transfer and payments FinTech models.

In addition to understanding respondents' knowledge of FinTech products, the next set of questions in the questionnaire sought to determine the actual usage of these FinTech products and services by the respondents. Again, these questions were designed using a likert scale format, where "1" indicates low usage and "5" represents high usage. The result is presented using descriptive statistics as shown in Table 4.7

Table 4.7 Mean Ranking of FinTech platforms with respect to usage

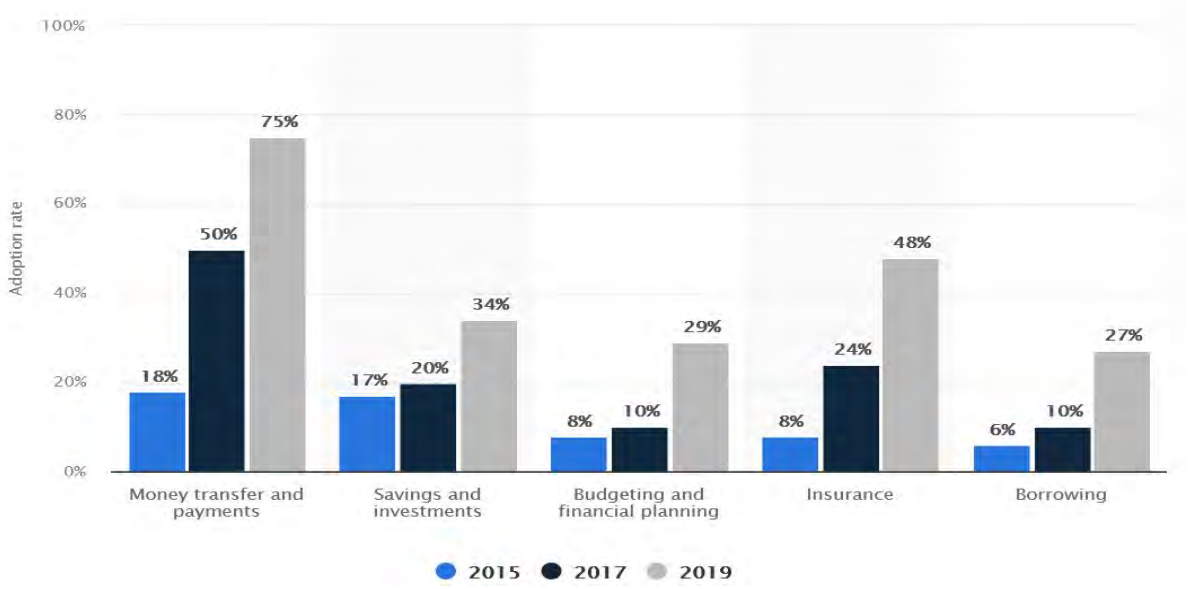
	N	Min	Max	Mean	Std. Deviation
Money Transfer and payment	818	1	5	4.45	1.399
Equity crowdfunding	818	1	5	3.55	1.174
Crypto-Currencies	818	1	5	3.23	1.32
Peer-to-Peer Lending	816	1	5	3.19	1.241
Robo-Advisors	816	1	5	3.51	1.149
Insurance	816	1	5	2.84	1.304

Scale (mean) 0 – 2.5 = low; 2.51 – 3.5 = Average and 3.51 and above = High

:

From the results presented in Table 4.7, it is observed that money transfer and payment FinTech (payment FinTech) have the highest usage, with a mean of 4.45 and a standard deviation of 1.399. Other FinTech products such as peer-to-peer lending platforms, crowdfunding, crypto-currencies, robo-advisors, and InsurTech have lower mean rankings compared to MTP. The result is not very surprising given that even though the use of FinTech products has witnessed significant increase, the majority of people, especially those in SSA, predominantly know and use mobile payment FinTech. This result is further corroborated by a recent study by Goldman Sachs, which found that digital payments constitute over 25% of the FinTech market. The result is also in tandem with the report issued by Statista (2021), which shows that even though FinTech usage has been increasing over the years, money transfer and payments FinTech have dominated all the other FinTech products in SSA (See Figure 4.7).

Figure 4.6 FinTech adoption rate (from 2015 to 2019)



***Source**: Statista (2021)*

The results above support the use of mobile payment FinTech as a proxy for assessing the factors affecting FinTech adoption within SSA. Thus, the analysis of research question 1 focuses on finding out the variables that affect the acceptance of mobile FinTech services.

4.4.1.3 Descriptive Statistics of Study Variable

This section describes the variables used to answer research question one. These variables are described using descriptive statistics such as the "mean, standard deviation, and minimum and maximum" values. In research question one, we investigate the variables that affect the adoption of FinTech services in SSA. To achieve this objective, twelve latent variables were employed. The twelve variables include nine independent variables, two mediation variables, and one dependent variable. The dependent variable is *FinTech adoption (ADP),* and it was measured using four items. The independent variables include a number of constructs, namely; economic benefits (ECB), perceived usefulness (PUS),

ease of use (EOU), convenience (CVN), financial risk (FRK), legal risk (LRK), operational risk (ORK), security risk (SRK), and privacy concerns (PVC). The mediating variables include knowledge and awareness (AWN) and trust (TRT). The descriptive statistics of these variables are captured in Table 4.8.

The mean values of the responses indicated the extent to which the respondents rated the statements. Mean values below, between 0 and 2.5, indicate that respondents on average disagree with the statements measuring the variable. A mean value of between 2.51 and 3.5 indicates that the respondents are generally neutral about the statements, whereas mean values of 3.51 and above provide support that respondents, on average, agree with the statement.

Table 4.8: Descriptive statistics of study variables

Variable	Min	Max	Mean	SD
AWN	1.00	5.00	3.0944	1.07907
ECB	1.00	5.00	3.6696	0.99784
EOU	1.00	5.00	3.3266	1.02489
PUS	1.00	5.00	3.5333	1.04522
CVN	1.00	5.00	3.8325	1.02676
FRK	1.00	5.00	3.1502	1.07594
SRK	1.00	5.00	3.0099	1.06664
LRK	1.00	5.00	2.8944	0.92563
ORK	1.00	5.00	2.8500	1.06145
PVC	1.00	5.00	3.1340	0.95749
TRT	1.00	5.00	3.2538	1.10395
ADP	1.00	5.00	3.7062	0.92214

Key: *FinTech adoption* ***(ADP),*** *Economic Benefits* ***(ECB)****, Perceived Usefulness* ***(PUS)****, Ease of Use (EOU), Convenience* ***(CVN)****, Financial Risk* ***(FRK)****, Legal Risk* ***(LRK)****, Operational Risk* ***(ORK)****, Security Risk* ***(SRK)****, and privacy concerns* ***(PVC)****, Knowledge and Awareness* ***(AWN)*** *and Trust* ***(TRT)***: Scale (mean) 0 – 2.5 = low; 2.51 – 3.5 = Average and 3.51 and above = High:

4.4.1.4 Correlation of Study Variables

The relationship between the variables was also examined using correlation analysis. The "Pearson's correlation analysis" was conducted to gain initial insight into the association between the variables, especially between the outcome variable and the explanatory (independent) variables. The results are captured in Table 4.8. From the result, it is observed that the majority of the variables positively correlate with each other. Also, the association between the most of the variables is statistically significant (correlation statistically significant at either p< 0.01 or p 0.01). For instance, from the result of the correlation analysis, it is observed that there is a strong positive relationship between perceived usefulness (PUS) and adoption ($r = 0.653$, $p < 0.01$). This result provides preliminary support for hypothesis 1 which postulates that there exist a positive strong relations between perceived usefulness of FinTech services and consumer's adoption intention and usage Furthermore, the strong positive and significant association between ease of use of FinTech services (EOU) and FinTech Adoption ($r=0.475$, $p<0.01$) also provides some initial evidence in support the formulated hypotheses.

The result of the correlation analysis is relevant as it provides a preliminary understanding of the relationship among the variables. Structured equation modelling (SEM) was used to figure out how much the predictor variables really affected the dependent variable.

Table 4.9 Correlation Results

	1	2	3	4	5	6	7	8	9	10	11	12
1. ADP	1											
2. TRT	0.526**	1										
3.PUS	0.653**	0.471	1									
4. PVC	-0.524**	0.789**	0.475**	1								
5. ORK	-0.213*	0.491**	0.346**	0.530**	1							
6. LRK	-0.107*	0.181**	0.219*	0.298**	0.539**	1						
7. SRK	-0.156*	0.019	0.269**	0.040	0.246**	0.711**	1					
8. FRK	0.238*	0.208**	0.393**	0.245**	0.341**	0.657**	0.630**	1				
9. CVN	0.627**	0.467**	0.707**	0.516**	0.348**	0.322**	0.312**	0.467**	1			
10. ECB	0.666**	0.542**	0.745**	0.581**	0.410**	0.282**	0.222**	0.338**	0.695**	1		
11. EOU	0.475**	0.549**	0.781**	0.506**	0.350**	0.210**	0.272**	0.366**	0.644**	0.697**	1	
12.AWN	0.359**	0.379**	0.616**	0.350**	0.268**	0.236**	0.344**	0.344**	0.484**	0.469**	0.580**	1

N=818
**** - "Correlation statistically significant at p<0.01"**
*** -" Correlation is statistically significant at p<0.05"**

Key: *FinTech adoption* ***(ADP),*** *Economic Benefits* ***(ECB)****, Perceived Usefulness* ***(PUS)****, Ease of Use (EOU), Convenience* ***(CVN)****, Financial Risk* ***(FRK)****, Legal Risk* ***(LRK)****, Operational Risk* ***(ORK)****, Security Risk* ***(SRK)****, and privacy concerns* ***(PVC)****, Knowledge and Awareness* ***(AWN)*** *and Trust* ***(TRT)***

4.4.1.5 Preliminary Test of Assumptions

Multivariate Normality Test

The multivariate normality test was conducted using the "Shapiro-Wilk test and the Kolmogorov-Smirnov test". This test was conducted with the null hypothesis that the sample comes from a normal distribution as against the alternative hypothesis which indicates that the sample does not come from a normal distribution. Thus, the following hypotheses were tested:

H_0 *: The sample is obtained from a normal distribution*

H_1 *: The sample does not come from a normal distribution*

The rejection or otherwise of the hypothesis is based on the following rule of thumb:

a. “If the p value is less than 0.05 ($p \leq 0.05$), we reject the null hypothesis in favour of the alternative hypothesis”.
b. “On the other hand, if the p-value is greater than 0.05 ($p \geq 0.05$), we fail to reject the null hypothesis.”

The result of the normality test, as presented in Table 4.10 indicate that all the variables have coefficients (β) that are highly significant ($p \leq 0.01$), which shows that the null hypothesis is rejected in favour of the alternative hypothesis. The implication of this result is that the sample was not obtained from a normal distribution.

The above result provides the justification for the use of the PLS-SEM techniques. Since PLS-SEM is distribution free and a non-parametric estimation technique, it does not need the assumption of normality to make the estimates robust. Thus, in situations where the data is deemed skewed and not normally distributed, the path modelling with PLS is recommended (Hair et al. 2014). This proposition is further supported by Zainab et al. (2014) who posit that PLS-SEM is suitable in estimations where the assumption of normality of the data cannot met.

Table 4.10: Results of the Tests of Normality of Data

	'Kolmogorov-Smirnov"			"Shapiro-Wilk"		
	Statistic	df	Sig.	Statistic	df	Sig.
AWN	0.107	728	.000	.958	728	.000
BEN	0.140	728	.000	.912	728	.000
EOU	0.149	728	.000	.952	728	.000
ECB	0.153	728	.000	.944	728	.000
CVN	0.143	728	.000	.911	728	.000
FRK	0.091	728	.000	.962	728	.000
SRK	0.146	728	.000	.934	728	.000
LRK	0.139	728	.000	.967	728	.000
ORK	0.112	728	.000	.959	728	.000
PVC	0.110	728	.000	.967	728	.000
Trust	0.150	728	.000	.944	728	.000

***"Key**: FinTech adoption **(ADP),** Economic Benefits (**ECB**), Perceived Usefulness (**PUS**), Ease of Use (EOU), Convenience (**CVN**), Financial Risk (**FRK**), Legal Risk (**LRK**), Operational Risk (**ORK**), Security Risk (**SRK**), and privacy concerns (**PVC**), Knowledge and Awareness (**AWN**) and Trust (**TRT**)"*

Test of Multicolinearity

In multivariate analysis, multicolinearity "occurs when the independent variables are highly correlated with each other" (Hair et al. 2014). According to Pallant (2011), multicolinearity could overstate the result and provide unreliable regression estimates. Since the analysis employs partial least squares (PLS) it is important that the problem of multicolinearity is resolved since PLS models are very sensitive to variables with multicolinearity (Hair et al., 2014). The multicolinearity test is relevant in PLS models since a good model should not exhibit multicolinearity. To determine the extent to which this problem exist within the data, some preliminary tests were conducted. First, we examined the correlation between the independent variables using the correlation results captured in Table 4.9. A cursory review of correlation coefficients indicates that there is no suspicion of multicolinearity among the variables. This is because the independent or

exogenous variables are not significantly correlated with each other. Pallant (2011) has stated that a high association between the predictor variables such that ($r \geq 0.85$) is strong indication of the presence of multicolinearity. A cursory look at the correlation result indicates that there are no such strong relationship among the independent variables and therefore, we can conclude that there is no problem of multicolinearity.

Furthermore, the variance inflation factor (VIF) and tolerance values of each of the independent variables was assessed to determine the presence or absence of multicolinearity. This result is captured in Table 4.11. To determine the whether there is the presence of multicolinearity or not, the value of the VIF statistic is important. If an independent variable, for example, is significantly associated with the other variables in the equation, its VIF will be very high. Whereas Farrar and Glauber (1976) regarded a VIF of 10 to be indicative of multicollinearity a large number of researchers assumed multicollinearity to exist at a significantly lower rate. Adeboye et al. (2014), for example, believe a VIF of 2.5 to be an indicator of multicollinearity. To Pallant (2011), a VIF value of 5 and above provides evidence of multicolinearity whereas those below five gives indication of no multicolinearity. Hair et al. (2014) has observed that if the VIF are less that 5 (VIF < 5), then there is no problem of multicolinearity among the independent variables. From the result presented in Table 4.11, it is clear that all the VIF values are less than 5, providing evidence to support the assumption of no multicolinearity among the independent variables.

Table 4:11: *Test of Multicolinearity*

Variable	VIF	Tolerance
AWN	0.552	1.813
PUS	0.257	3.898
EOU	0.314	3.189
ECB	0.331	3.019
CVN	0.384	2.602
FRK	0.444	2.254
SRK	0.350	2.860
LRK	0.274	3.651
ORK	0.513	1.950
PVC	0.297	3.370
TRT	0.325	3.075

Key: *FinTech adoption **(ADP),** Economic Benefits (**ECB**), Perceived Usefulness (**PUS**), Ease of Use (EOU), Convenience (**CVN**), Financial Risk (**FRK**), Legal Risk (**LRK**), Operational Risk (**ORK**), Security Risk (**SRK**), and privacy concerns (**PVC**), Knowledge and Awareness (**AWN**) and Trust (**TRT**Source:*

Factor Analysis

After ensuring that key assumptions about the data are met, exploratory factor analysis was performed to examine the interrelationships among the items used to measure the constructs. The first step was to ensure that the sample employed is adequate for the analysis. This was addressed by using the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy. According to Netemeyer et al. (2003), a KMO value of 0.6 and above indicates that the sample is adequate for EFA analysis. The result of the KMO analysis, as shown in Table 4.12, gives a KMO value of 0.842, confirming the sampling adequacy of the data for the EFA analysis. Furthermore, the stability of the EFA was confirmed by employing the Bartlett test of Sphericity. From the result in Table 4.12, a chi-square value of 29743.627 is obtained, which is statistically significant, indicating that the result of the CFA is stable (Hair et al. 2010). Based on the results obtained, it can be confirmed that the variables and their associated data are suitable for performing the exploratory factor analysis.

Table 4.12. KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.842
Bartlett's Test of Sphericity	Approx. Chi-Square	29743.627
	df	741
	Sig.	.000

Source: *Researcher's Own Construct, 2022*

After investigating the suitability of the data for factor analysis and observing that there are no violations, "the factor loadings, composite reliability (CR), average variance extracted (AVE), and Rho_A statistics" are presented in Table 4.13. All the items load very well under their respective constructs, suggesting that all the items were suitable for the analysis. Second, the AVE, CR and Rho_A values all meet required standards for SEM. For instance, as shown in Figure 4.13, the AVE for all the constructs exceeds the minimum threshold of 0.5, indicating acceptable validity of the constructs. Finally, result obtained in Table 4.13, it can be stated that all the CR values are above the minimum threshold of 0.7 and therefore the requirement of construct reliability is met as far as the data is concerned. According to Hair et al. (2011) a strong argument can be made for validity and reliability of the measures if Rho_A >0.7, Cronbach's A>0.7, and Composite Reliability >0.7. From the result obtained in Table 4.13, it is observed that these important validity and reliability criteria are met.

Table 4.13 Measurement of reliability and validity of Construct

Construct	CR	AVE	Rho_A
ADP	0.928	0.763	0.905
CVN	0.950	0.863	0.924
ECN	0.923	0.799	0.876
EOU	0.889	0.800	0.761
FRK	0.881	0.713	0.843
KNG	0.922	0.748	0.890
LRK	0.842	0.642	0.890
ORK	0.917	0.786	0.892
PUS	0.915	0.731	0.883
PVC	0.869	0.690	0.792
SRK	0.900	0.753	0.983
TRS	0.955	0.841	0.938

"Key: *FinTech adoption **(ADP),** Economic Benefits (**ECB**), Perceived Usefulness (**PUS**), Ease of Use (EOU), Convenience (**CVN**), Financial Risk (**FRK**), Legal Risk (**LRK**), Operational Risk (**ORK**), Security Risk (**SRK**), and privacy concerns (**PVC**), Knowledge and Awareness (**AWN**) and Trust (**TRT**)"*

4.4.1.6 Estimation of the Structural Model: Testing of Hypotheses

With good measurement models and no problem with multicollinearity, coupled with the confirmation of good construct validity, this section presents the result of the hypotheses using SEM. Structural Equation Modeling is a statistical tool usually used to ascertain the association between variables through the application of the covariance matrix of the variable. It is a form of multivariate data analysis applied to establish the link between dependent variable on one hand, and independent variables on the other. This section presents the result of the structural equation modelling, which was estimated using SmartPLS 3.0. The path coefficient or beta (β) and the t-values of the estimates are used to determine the direction of the relationship and the significance, respectively. In general, if the t-value is greater than 1.96 ($t \geq 1.96$), the coefficient or β is significant at ($p \leq 0.05$). If $t \geq 2.58$, then β is significant at $p \leq 0.01$. Also, if $t \geq 3.1$, then β is significant at $p \leq 0.001$ (Hu et al. 2019). In this study, we apply these benchmarks to determine whether the null hypothesis should be accepted or rejected. For instance, if the p-value obtained is

less than or equal to 0.05 ($p \leq 0.05$), we reject the null hypotheses and accept the null hypothesis. On the other hand, if the p-value is greater than 0.5, the null hypothesis is accepted and the alternative hypothesis is rejected. The result of the SEM analysis is presented in Tables 14, 15, and Figure 4.7.

Table 4.14 Result of Hypothesis Testing

Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
CVN -> ADP	0.280**	0.279	0.038	7.432	**0.000**
ECB -> ADP	0.342**	0.340	0.044	7.852	**0.000**
EOU -> ADP	0.317**	0.318	0.041	7.659	**0.000**
FRK -> ADP	-0.029	-0.034	0.036	0.789	**0.430**
AWN -> ADP	-0.033	-0.033	0.031	1.090	**0.276**
LRK -> ADP	-0.179**	-0.169	0.054	3.296	**0.001**
ORK -> ADP	-0.120**	-0.123	0.030	3.969	**0.000**
PUS -> ADP	0.309**	0.312	0.048	6.466	**0.000**
PVC -> ADP	-0.147**	-0.147	0.038	3.874	**0.000**
SRK -> ADP	-0.181**	0.177	0.044	4.084	**0.000**
TRS -> ADP	0.239**	0.242	0.045	5.269	**0.000**

Key*: FinTech adoption **(ADP),** Economic Benefits (**ECB**), Perceived Usefulness (**PUS**), Ease of Use (EOU), Convenience (**CVN**), Financial Risk (**FRK**), Legal Risk (**LRK**), Operational Risk (**ORK**), Security Risk (**SRK**), and privacy concerns (**PVC**), Knowledge and Awareness (**AWN**) and Trust (**TRT***

***** represents 1% significant level***

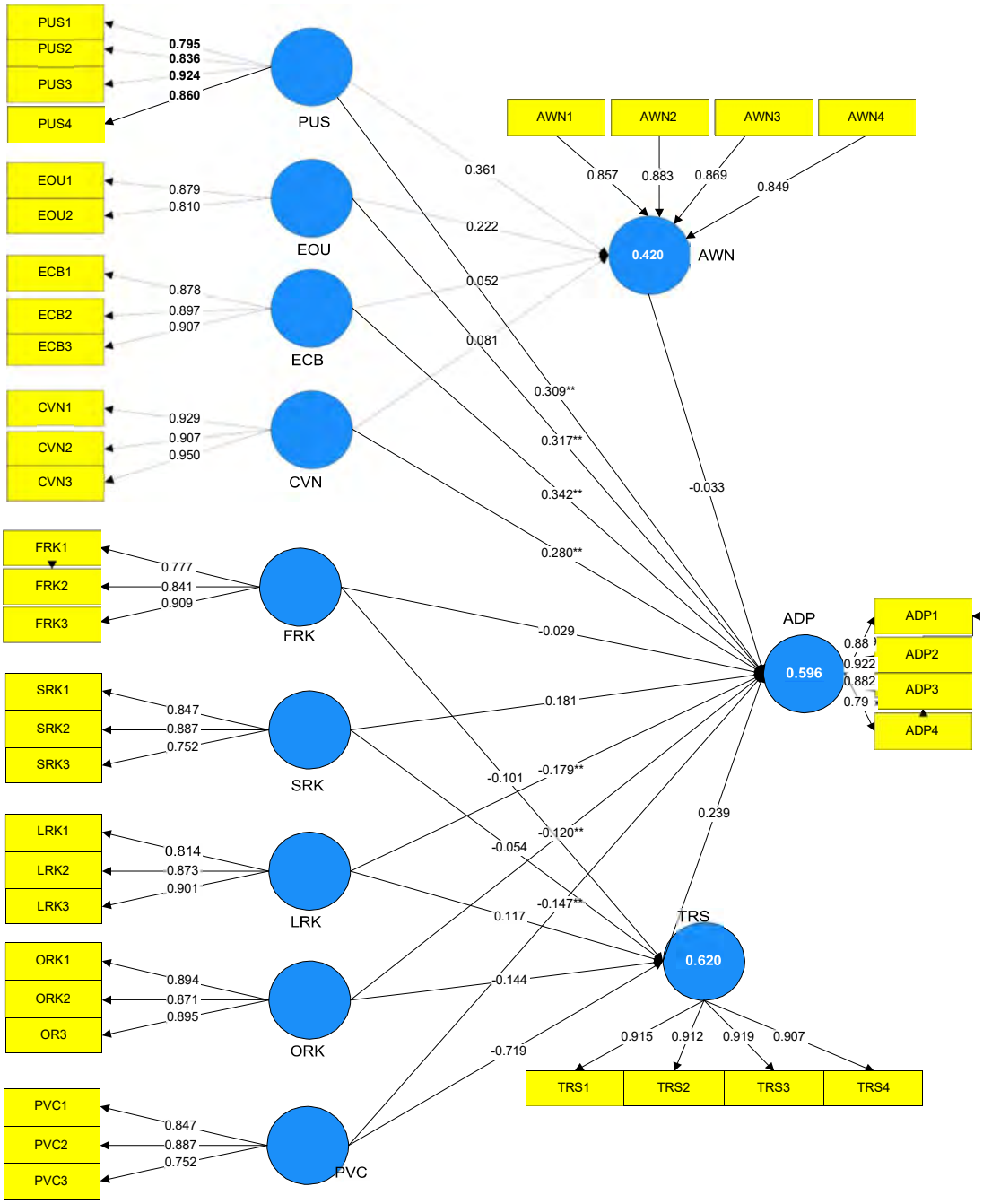
Table 4.15 Indirect Effect (Mediation Results)

Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
LRK -> TRS -> ADP	-0.036**	-0.035	0.012	3.168	**0.002**
ECN -> AWN -> ADP	-0.002	-0.001	0.003	0.613	**0.540**
EOU -> AWN -> ADP	-0.007	-0.007	0.007	1.098	**0.273**
PVC -> TRS -> ADP	0.172**	0.174	0.033	5.259	**0.000**
FRK -> TRS -> ADP	0.026**	0.025	0.007	3.790	**0.000**
PUS -> AWN -> ADP	-0.012	-0.012	0.012	1.034	**0.302**
SRK -> TRS -> ADP	-0.008	-0.009	0.008	0.969	**0.333**
CVN -> AWN -> ADP	-0.003	-0.002	0.003	0.916	**0.360**
ORK -> TRS -> ADP	0.037**	0.037	0.010	3.817	**0.000**

Key*: FinTech adoption **(ADP),** Economic Benefits (**ECB**), Perceived Usefulness (**PUS**), Ease of Use (EOU), Convenience (**CVN**), Financial Risk (**FRK**), Legal Risk (**LRK**), Operational Risk (**ORK**), Security Risk (**SRK**), and privacy concerns (**PVC**), Knowledge and Awareness (**AWN**) and Trust (**TRT**)*

***** represents 1% significant level***

Figure 4.7: Path Diagram Illustration of SEM analysis



Source: Researcher's construct, 2022

Brief Presentation of the results of research question 1

A number of factors were perceived to be influencing FinTech adoption were considered under research question 1. These factors can be broadly categorized into benefit Factors and risk factors. The a priori expectation is that whereas benefit related factors will influence FinTech adoption positively, risk related factors will impede or negatively affect Fintech adoption. The result, of the analysis is presented in Table 4.14 and Figure 4.7. The result was estimated using path analysis with the help of SmartPLS 3 Software. For the purposes of this research, the significant value of 5% is used since it is the most common benchmark for either accepting or rejecting hypothesis in survey-based research (Lavraskas, 2008).

From the result in Table 4.13 it can be observed that there is a significant positive relationship between PUS and adoption or use FinTech services (β=0.309, t=6.162, p=0.001). Since the p-value is less than 0.05 ($t \geq 1.96$) we reject the null hypothesis of no significant relationship and conclude that a significant relationship exists between the variables. This result implies that H1 is supported by the model.

It has further hypothesized that perceived economic benefit has positive influence on FinTech Adoption. From the result, it is observed that ECB has significant positive influence on ADP (β=0.342, t=7.85, p=0.001). As a result, we conclude that economic benefit is a significant positive driver of FinTech adoption.

Again, EOU is observed to have a significant positive effect on adoption (β=3.17, t=7.659, p=0.001). The result implies that ease of use of FinTech services has a significant positive influence on adoption intention of consumers.

We further tested the hypothesis that convenience associated with FinTech services positively influence adoption. The empirical model in Table 4.14 indicates that a strong positive relationship exists between CVN and ADP (β=0.280, t=7.432, p=0.001).

We also expected that knowledge of FinTech services is a significant positive determinant of its adoption. From the empirical model, the p-value is 0.273, which greater than 0.05. The result implies that there is no significant relationship between AWN and ADP, and therefore awareness of fintech service by consumers does not significantly influence adoption intentions.

We further hypothesized that trust is a positive determinant of FinTech adoption. From the empirical model, it is observed that this hypothesis is supported as the p-value of 0.000 was recorded, which is less than 0.05 (β=-0.147, t=3.874, p=0.001)

We also hypothesized that financial risk (FRK) has a negative effect on FinTech adoption. From the empirical result presented in Table 4.14 and Figure 4.9, it is observed that this hypothesis is not supported by the empirical model. This is because the p-value of 0.430 is greater than 0.05. Thus, it can be concluded that there is no significant relationship between financial risk and FinTech adoption.

From the estimated empirical model, security risk negatively influences FinTech adoption. This is because β=-0.181, t=4.084, p=0.001. The result implies that perceived security risk associated with FinTech services has significant negative influence on adoption intentions.

We further postulated that operational risk associated with FinTech services is a significant negative determinant of FinTech adoption. Based on the empirical model

presented, we observe that operational risk has significant negative influence on FinTech adoption (β=-0.120, t=3.969, p=0.001).

The result further indicates that legal risk associated with FinTech services is a significant negative determinant of FinTech adoption. Our empirical result supports this assertion, ie (β=-0.179, t=3.296, p=0.001). It was further postulate that privacy concerns associated with FinTech services negatively influence adoption behaviour. This hypothesis is supported by the empirical model, given the following parameters (β=-0.147, t=3.874, p=0.001).

In Table 4.15, the result of the indirect relationship between the variables is presented. This result helps to determine the extent to which trust mediates the relationship between perceived risk related variables and FinTech adoption. It also demonstrates the extent to which knowledge or awareness of FinTech service mediates the relationship between perceived benefit factors and adoption of FinTech. From the empirical result, it is observed that knowledge/awareness of FinTech services does not significantly mediate the relationship between benefit factors and Adoption of FinTech. Put differently, awareness/knowledge of FinTech does not significantly mediate the relationship between ECB, PUS, EOU, and CVN on one hand and FinTech adoption on the other. The result, however, demonstrate that trust is a significant mediator between risk factors and adoption intentions. For instance, trust positively mediates the relationship between operational risk and FinTech adoption (β=-0.037, t=3.817, p=0.001). Again, it also positively mediates the relationship between PVC, FRK on one hand and FinTech adoption on the other. However, the result shows that trust does not significantly mediate the relationship between security risk and FinTech adoption (β=0.008, t=0.969, p=0.333)

4.4.1.7 Individual Country Analysis

In addition to the aggregate analysis, the analysis of individual country data with respect to the factors influencing FinTech adoption is captured in Table 4.16. The results show the path coefficient and the t-values (in parenthesis) for each of the four countries. From the result, it is observed that in all the countries (Ghana, Nigeria, Kenya, and South Africa), the perceived usefulness of FinTech services (PUS), economic benefits (ECB), Convenience (CVN), and ease of use (EOU) are observed to be statistically significant determinants of FinTech adoption. This result is no different from the one obtained by combining the data from each of the countries. It was, however observed that with the exception of South Africa, FinTech awareness/knowledge does not necessarily influence FinTech adoption. In South Africa, we observe that FinTech knowledge or awareness is a significant predictor of adoption. It is further observed that trust is a major determinant of FinTech adoption for respondents across all the selected countries. Financial risk was found to be a statistically insignificant determinant of FinTech adoption in three of the countries (Ghana, Nigeria and Kenya), but it is has significant negative effect on FinTech adoption in South Africa.

Table 4.16: Results of the path analysis across the Four Countries

Relationships	Ghana	Nigeria	Kenya	South Africa
PUS ⟶ ADP	0.274**	0.148**	0.458**	0.355**
	(3.520)	*(3.170)*	*(3.344)*	*(3.243)*
EOU ⟶ ADP	0.253**	0.214*	-0.251	0.332**
	(3.295)	*(3.447)*	*(2.319)*	*(2.985)*
ECB ⟶ ADP	0.273**	0.355**	0.239*	0.411**
	(3.937)	*(3.691)*	*(1.995)*	*(3.296)*
CVN ⟶ ADP	0.301**	0.118*	0.349**	0.295*
	(5.754)	*(2.877)*	*(3.061)*	*(2.908)*
AWNS ⟶ ADP	0.012	0.290	-0.210	-0.146*
	(0.237)	*(1.587)*	*(2.280)*	*(2.009)*
FRSK ⟶ ADP	-0.120	-0.225	-0.180	-0.240*
	(1.670)	*(1.811)*	*(1.642)*	*(2.609)*
SRSK ⟶ ADP	0.409**	0.048	0.258*	0.144*
	(3.521)	*(0.434)*	*(2.120)*	*(1.983)*
ORSK ⟶ ADP	-0.042	-0.329**	-0.107*	-0.042
	(0.722)	*(4.002)*	*(5.063)*	*(0.575)*
LRSK ⟶ ADP	-0.276*	0.033	-0.195*	-0.322**
	(2.128)	*(0.286)*	*(1.998)*	*(2.624)*
PVC ⟶ ADP	-0.147*	-0.006	-0.195*	0.168**
	(2.057)	*(0.062)*	*(3.347)*	*(3.476)*
TRS ⟶ ADP	0.246**	0.146*	0.333**	0.199*
	(3.029)	*(0.062)*	*(2.755)*	*(2.782)*
$Adj.R^2$	0.45	0.365	0.53	0.46

*"$p < 0.05$. **"$p < 0.01$."

"T-values in parenthesis"

In Ghana, Kenya, and South Africa, security risk was found to be a significant factor of FinTech adoption, but in Nigeria, it was determined to be statistically insignificant. In three of the countries, legal risk was also discovered to be a key factor influencing FinTech adoption. (Ghana, Kenya, and South Africa).

4.4.1.8 Model Fit Indices

The estimated empirical model was further tested to determine how well it fit the data. In addition to the various reliability and validity tests, there was a need to investigate the robustness of the model using model fit indicators. These indicators were generated by the SmartPLS software. In regression, the “coefficient of determination”, or R-square, "is the amount of variation in one variable (dependent variable or response) explained by other factors (explanatory variables)" (Kasuya, 2019, p 1). This is a commonly used metric for determining the “strength of a regression relationship” (Kasuya, 2019). It also shows the percentage of variations in the dependent variable that is explained by the independent variable. The adjusted R-squared ($Adj.R^2$) value makes adjustments to the estimated R-squared value based on the number of independent variables. It must be stated that whereas R-square tends to overestimate the fitness of the linear regression, the adjusted R-square goodness-of-fit statistic seeks to correct this overestimation (Miles and Shevlin, 2014). For instance, when using the R-Square, an increase or decrease in the number of independent variables results in a rise or fall in the R-square value. However, the $Adj.R^2$ value will actually decrease when a predictor variable that is not efficient is added to the model. According to Cohen (2003), the $Adj.R^2$ is suitable for evaluating the model fit since it avoids the bias associated with the number of predictor variables in the model. Even though $Adj.R^2$ values can range between 0 and 1, Henseler et al. (2016) have posited that $Adj.R^2$ value of 0.7 is considered substantial, whereas those below 0.26 are considered weak. The adjusted R-square is estimated by:

$$Adj.R^2 = 1 - (1 - R^2)\frac{N-1}{N-K-1}$$

Where:

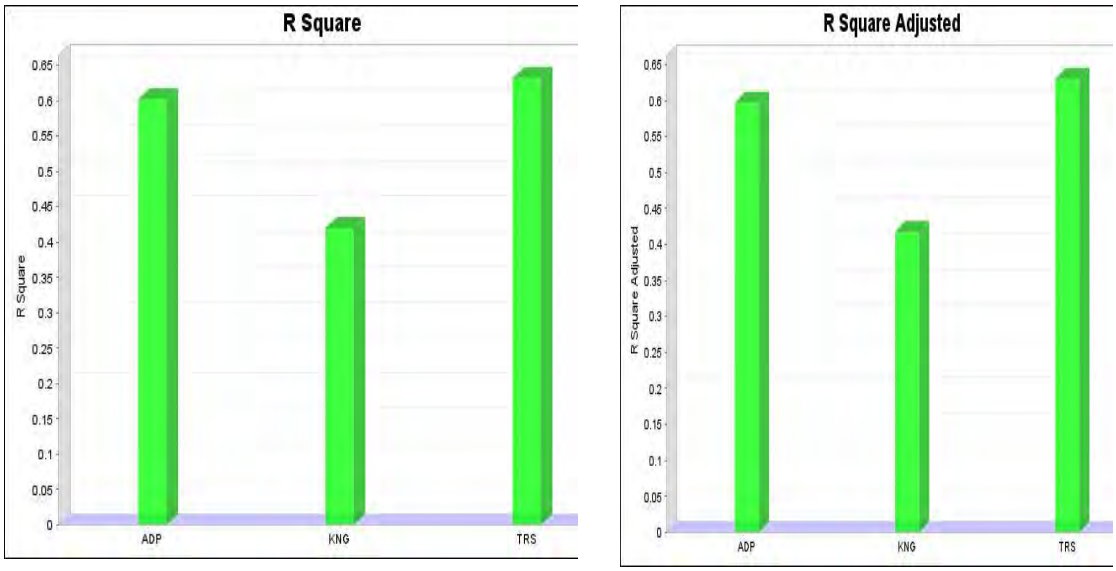
N= “Sample size”,

K “is the number of predictor variables”.

$K \leq R^2$. If Adj. $R^2 = 1$, a model that predicts values in the target field is present. A model with an $Adj.R^2$ of 0 has no predictive value.

From the result presented in Figure 4.9, the R-square adjusted value obtained is 0.6 or 60% for adoption. This result means that the predictor variables together explain 60% of the variations in the outcome variable. Also, as shown in Figure 4.8, an $Adj.R^2$ values of 0.63 and 0.420 was obtained for trust and knowledge/awareness respectively.

Figure 4.8: R-square and Adjusted R-square value



Source: Researcher’s own construct

In addition to the R-square values, other indicators are used to examine the model fitness. One of such indicators is the SRMR (“Standardized Root Mean Squared Residual”). Hu and Bentler (1999) have postulated that SRMR values of below 0.08 is

suitable for assessing the fitness of a structural model, whiles those above 0.08 depicts poor fit. It has been argued by some researchers that the recommended threshold for the SRMR to be acceptable is below 0.1. (Hu & Bentler, 1999). From the result in Table 4.17, it is observed that an SRMR value of 0.065 was obtained, which is lower than the 0.08. Thus, we base on the result and state that the model has a good fit.

Table 4.17 Model Fit Indicators

	Saturated Model	**Estimated Model**
SRMR	0.065	0.072
Chi-Square	9024.469	9115.293
NFI	0.694	0.691

4.4.2 Impact of FinTech adoption on borrowing, savings and investment

Objective two (Research Question 2) of this study examined the extent to which FinTech usage and adoption affects the savings, borrowing, and investment behaviour of consumers. This research question was answered by applying logistic regression to model the responses from the student sample. Logistic regression is suitable in estimations where the outcome variable is binary or categorical. Since the dependent variables involve the use of categorical variables, logistic regression was deemed useful for the analysis. Three different models are estimated. The first model estimates the effect of FinTech usage on savings. The second examines the effect of FinTech on borrowing, whereas the third investigates the effect of FinTech on investment.

Even though there are various approaches to estimating the logistic model, the current study applies the direct method. All the independent variables, including the control variables, are entered into the model at the same time without prioritizing any of them. The

direct approach is suitable for this research because none of the variables was considered a priority over the others.

4.4.2.1 Assumptions of Logistic Regression

Multicolinearity: One of the key assumptions that must be met when using logistic regression is the absence of multicolinearity. The presence or absence of this problem was tested using VIF and Tolerance Estimates. The "general rule of thumb" is that the VIF values should not exceed 5. According to Hair et al. (2014), the VIF should be less than 5 (VIF < 5) to give assurance of no multicolinearity. Hair et al. (2014) have observed that if the VIF is less than 5 (VIF < 5), then there is no problem of multicolinearity among the independent variables. From the results presented in Table 4.18, it is clear that all the VIF values are less than 5 in all cases, which is an indication that there is an absence of multicolinearity among the independent variables.

Table 4.18 Multicolinearity Test

	Colliniarity Statistics	
Variables	**Tolerance**	**VIF**
Money Transfer and Payment	0.809	1.236
Equity Crowdfunding	0.417	2.398
P2P Lending	0.451	2.217
Robo-Advisors	0.225	4.451
InsurTech	0.420	2.383

Source: Researcher's Own Construct

Sample Size: Another important requirement for a robust logistic regression estimate is the adequacy of the sample size. According to Tabachnick and Fidell (2007), inadequate sample size in logistic regression produces spurious estimates that cannot provide valid results. Some researchers have posited that 20 observations per independent

variable is suitable for estimating logistic regression (Peduzzi et al., 1996). Others have also suggested that 10 observations per independent variable is appropriate to ensure the validity of logistic regression estimates (Hosmer & Lemeshow, 2000). In logistic regression, cases are recognized in the estimation if and only if there are values for every independent variable. From the results presented in Table 4.19, it is observed that 62 cases, representing 7.6%, are excluded as a result of missing values. However, there are 758 cases that have been included, which constitutes 92.4% of all cases. Given that the predictor variables in the logistic regression model are less than 10, it implies that the sample size is adequate to ensure the validity of the logistic regression estimation.

Table 4.19: Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	756	92.4
	Missing Cases	62	7.6
	Total	820	100.0
Unselected Cases		0	.0
Total		818	100.0

a. If weight is in effect, see classification table for the total number of cases.

Source: Researcher's own Construct, 2022

Dichotomous dependent variable: Another important assumption that must be considered when performing binary logistic regression is that the outcome variable must be dichotomous. This implies that it should be either yes or no, use or do not use, male or female, etc. This assumption is met in this study because the dependent variable measures whether the consumer saves, borrows, or invests with FinTech products or not.

4.4.2.2 Model Estimation

The first model calculates the impact of FinTech on savings. The dependent variable is a dummy which is coded as 1 if the individual reports saving with FinTech products for the past year, and 0 if otherwise. The second model (model 2) estimates the effect of FinTech on borrowing. The dependent variable is a dummy which is coded as 1 if the individual reports borrowing with FinTech products for the past year, and 0 if otherwise. The third model investigates the effect of FinTech on investment. The dependent variable is a dummy which is coded as 1 if the individual reports investing in FinTech products for the past year, and 0 if otherwise. The independent variables include usage of "mobile payments, crowdfunding platforms, peer-to-peer lending, robo-advisors, budgeting applications, stock apps, and insurance apps". The control variables include age, income, and education.

Validation of the Model: The validity of the models were tested using Omnibus Tests of Model Coefficients. The model test the overall efficacy of the equation and how well it performs (Pallant, 2011). It is often described as the goodness of fit test for logistic regression. A good fit indicates that all the predictor variables simultaneously influence the outcome variable. For the model to fit well, a significant statistic with p-value less than 0.05 is required. The result of the Omnibus Test of Model Coefficients is presented in Table 4.12. All the three rows in Table 4.12 have the same values because all the variables are entered as the same block or step. From the result, it is observed that all the models are highly significant; ie Model 1: $\left[\chi^2(11) = 165.019,\ p \leq 0.001\right]$, Model 2: $\left[\chi^2(11) = 231.827,\ p \leq 0.001\right]$, Model 3: $\left[\chi^2(11) = 172.202,\ p \leq 0.001\right]$. The

implication of this outcome is that a conclusion can be made to the effect that the model is statistically significant when compared with the null model.

Table 4.20 Model coefficient test

	Chi-Square	Df	Sig
Model 1			
Step	165.019	11	0.000
Block	165.019	11	0.000
Model	165.019	11	0.000
Model 2			
Step	231.827	11	0.000
Block	231.827	11	0.000
Model	231.827	11	0.000
Model 3			
Step	172.202	11	0.000
Block	172.202	11	0.000
Model	172.202	11	0.000

Hosmer-Lemeshow Tests

The test assess the null hypothesis which states that the logistic regression model fits the data applied in the estimation. Thus, the null hypotheses is compared with the alternative to indicate the validity of the model. As a rule of thumb, a non-significant Chi-Square (χ^2) value, ($p > 0.05$) indicates the fitness of the model. From the result presented in Table 4.21, it is observed that the χ^2 value for all the models are statistically insignificant, indicating that the null hypothesis is accepted with the rejection of the alternative hypothesis. Since the null hypothesis stipulates that the logistic regression model fits the data and it is accepted, it presupposes that the model is good and perfectly fits the data in all instances.

Table 4.21; Hosmer-Lemeshow Test of Model Fitness

Step	Chi-Square	Df	Sig
		Model 1	
1	4.844	8	0.752
		Model 2	
1	3.854	8	0.870
		Model 2	
1	9.844	8	0.621

Source: Researcher's own construct, 2022

4.4.2.3 Contribution of the Predictor Variables to the Model

The main result of the logistic regression analysis is presented in Table 4.22. It is the most important result in the regression analysis as it shows the contribution of each predictor variable on the outcome variable.

The contribution of each predictor variable to the model is estimated using the Wald test. In the logistic regression analysis, the null hypothesis stipulates that there is no association between the predictor variable and the dependent categorical variable, which implies that the coefficient, β, is zero. The alternative hypothesis states that the coefficient is not zero. This is stated as follows:

$H_0 : \beta = 0$

$H_1 : \beta \neq 0$

The "null hypothesis is rejected in favour of the alternative hypothesis if the p-value is less than or equal to 0.05 ($p \leq 0.05$)". Generally if the coefficient is positive and statistically significant it implies that as predictor variable increases, the dependent variable is also more likely to increase. On the other hand, if the coefficient is negative and significant it

implies that the dependent variable is likely to increase when the predictor variable decreases. In Table 4.22, the output of the Logistic regression, which shows the relationship between the outcome, predictor and control variables.

Table 4.22: "Contribution of Predictor Variables to the Model"

Variable	Model 1	Model 2	Model 3)
Money transfer and payment (MTP)	0.054 *(0.710)*	0.172* *(6.141)*	0.055 *(0.694)*
Equity Crowd Funding (ECF)	-0.214* *(3.447)*	-0.221* *(3.032)*	0.167* *(3.285)*
Peer-to-Peer (P2P)	0.446** *(18.689)*	6.22** *(31.96)*	0.295** *(8.827)*
Robo-Advisors (RAD)	0.482** *(9.299)*	0.310* *(3.916)*	0.345* *(5.214)*
InsurTech (IST)	-0.215* *(3.923)*	0.263** *(7.715)*	0.289** *(7.339)*
Sex	0.303 *(2.908)*	0.744** *(15.321)*	0.526** *(8.454)*
Age	-0.004 *(0.116)*	0.079** *(30.847)*	0.06** *(20.394)*
Income	1.491** *(28.779)*	0.871** *(10.116)*	0.717** *(8.272)*
Education	1.138** *(14.846)*	-0.723** *(5.458)*	0.395 *(1.525)*
Constant	-1.995** *(9.942)*	-5.504** *(62.927)*	-5.264** *(51.713)*
Pseudo R-Square: Nagelkerke	0.458	0.547	0.571

(Wald Values in Parenthesis)
Source: Researcher's own construct, 2022

The result in Table 4.22 presents the logistic regression coefficient together with the wald values (in parenthesis). Coefficient with one "*" indicates that the coefficient is statistically significant at $p \leq 0.05$, whiles those with two "**" indicate that the coefficient

is significant at p≤0.01. The Wald values from the logistic regression estimates are captured in parenthesis under each coefficient.

In model 1, it is observed that three of the predictor variables make significant contribution to the model since their p-values are less than or equal to 0.05 ($p \leq 0.05$). For instance, it is observed that the consumers who use of Robo-Advisors (automated financial advisors) are more likely to invest ($(\beta = 0.482, p = 0.01)$). Also, consumers who use P2P Lending are more likely to invest $(\beta = 0.446, p = 0.01)$. However, the use of equity crowdfunding $(\beta = -0.214, p = 0.04)$, and InsurTech $(\beta = -0.215, p = 0.04)$ are likely to reduce savings habit of consumers. It was further found from the estimations that the use of money transfer and payment $(\beta = 0.054, p = 0.452)$, makes no significant contribution to the model. With regards to the control variables, the estimation of model 1 shows that income and educational level of the respondents makes significant contribution to the model. For instance, income $(\beta = 1.491, p = 0.001)$ and educational level $(\beta = 1.138, p = 0.001)$ have significant positive effect on savings behaviour of consumers. Put differently, higher income consumers are more likely to save whiles highly educated persons are also likely to save.

In model 2, the influence of FinTech on borrowing behaviour of consumers were examined. The estimation of the logistic regression model indicates that four predictor variables: MTP $(\beta = 0.172, p = 0.045)$, P2P $(\beta = 6.22, p = 0.01)$ RAD $(\beta = 0.310, p = 0.01)$, and InsurTech $(\beta = 0.263, p = 0.01)$ make significant positive contribution to the model. In the same model, all the control variables Sex

$(\beta = 0.744, p = 0.01)$, Age $(\beta = 0.079, p = 0.01)$ income $(\beta = 0.871, p = 0.001)$ and education $(\beta = -0.723, p = 0.01)$ make significant contribution to the model. However,

whereas sex, age and income make significant positive contribution to savings, education on the other hand, has a significant negative influence on borrowing.

In model 3, the influence of FinTech usage on investment behaviour of consumers was assessed. From the result, it is observed that four out of the five predictor variables makes significant contribution to the model. For instance, P2P ($\beta = 0.295, p = 0.01$), ECF ($\beta = 0.167, p = 0.04$), RAD ($\beta = 0.345, p = 0.032$) and InsurTech ($\beta = 0.289, p = 0.02$) all have significant positive influence on the investment behaviour of consumers. The result further shows that all the control variables, with the exception of Education have significant positive influence on investment behaviour of respondents.

4.4.2.4 Predictive Power of the Model

Unlike ordinary least square (OLS) regression, where the predictive power of the model is tested using the Coefficient of determination or R-Square (or adjusted R-square), the predictive model of logit models are often assessed using a form of pseudo R-square which may either be Cox & Snell R-square or Negelkerke R-Square. According to Farid (2010), the pseudo r-square is adequate if it is able to explain at least 30% of the variations in the dependent variables. Based on the result obtained in this analysis, we observed by model 1, 2 and 3 have R-square values of 0.458, 0.547, and 0.571, respectively. The result implies that 45.8%, 54.7%, and 57.1% of the variations in savings, borrowing, and investment of consumers are influenced respectively by FinTech usage. The result shows that the explanatory power of the independent variables is good.

4.4.2.5 Analysis of individual countries

In addition to examining the countries together as a unit, we further investigated the effect of FinTech on savings, investment and borrowing for each of the four selected countries. Table 4.23 shows the result of logistic regression analysis for the individual countries under consideration. Model 1, model 2 and model 3 respectively use savings, investment and borrowing as dependent variables. The aim is to ascertain the factors that determine the intentions of individuals to either save, borrow or invest with FinTech platforms. The three dependent variables (savings, borrowing, and investment) are coded as binary outcome. For instance, whereas 1 represent savings with FinTech platforms, 0 represent non-savings with FinTech platform. The same coding is applied to the other dependent variables (investment and borrowing). The predictor variables include the use of mobile payment and transfer (MPT) platform, the use of Equity crowndfunding platform, the use of P2P platforms, the use of robo-advisors platform, the use of InsurTech platforms. Other predictor variables considered include sex, income, education and age.
Model 1, model 2 and model 3 respectively use savings, borrowing and investment as dependent variables. The base line assumptions for all the countries were met, indicating that the models met the basic requirements for logistic regression. The output of the regression estimations, as presented in Table 4.19 is analyzed as follows:

First, we find that consumers who use of automated asset management platforms or Robo-Advisors, are more likely to save, invest and borrow using FinTech platforms. This result is true for all the four countries. Second, we further find that the use of money transfer and payment (MTP) platforms does not necessarily affect savings, borrowing and investment. We observe from the result that the use of robo-advisors or financial

management service influence savings, investment and borrowing across all the countries. We further observe that the use of InsurTech partially influence savings, investment and borrowing using FinTech platforms.

Table 4.23: Logistic regression results of individual countries

	Ghana			Nigeria			Kenya			South Africa		
Variable	Model1	Model 2	Model 3	Model 1	Model 2	Model	Model1	Model 2	*Model 3*	Model1	Model 2	*Model 3*
MPT	-0.092 *(0.910)*	0.285* *(4.696)*	0.101 *(1.017)*	0.042 *(0.187)*	0.182* *(3.996)*	0.012 *(0.014)*	.091 *(.233)*	0.185* *(4.156)*	-0.071 *(1.118)*	.215 *(1.950)*	-.028 *(.034)*	.132 *(.742)*
ECF	0.355* *(4.690)*	0.383* *(5.181)*	0.571* *(6.198)*	0.190** *(9.311)*	0.248* *(5.076)*	-.040 *(.057)*	-.349 *(.484)*	.341 *(.800)*	0.215* *(5.122)*	-.706* *(5.772)*	.132* *(4.272)*	0.315** *(7.222)*
P2P	0.075 *(0.257)*	0.472* *(4.794)*	0.215* *(5.157)*	0.155* *(4.041)*	0.262* *(6.120)*	.011 *(.005)*	.713* *(4.849)*	.717* *(5.082)*	0.313* *(7.314)*	.190 *(.587)*	.163 *(.536)*	-.571* *(5.311)*
RAD	0.596** *(9.250)*	0.383** *(6.572)*	0.212 *(1.314)*	0.672** *(11.049)*	0.532** *(6.566)*	0.736** *(11.933)*	1.217* *(4.973)*	-.945* *(3.649)*	0.347* *(4.548)*	.682* *(4.056)*	-.046* *(.028)*	.714* *(4.714)*
InsurTech (IST)	-0.008 *(0.002)*	0.286* *(3.887)*	0.247* *(3.548)*	0.112 *(0.508)*	0. 301* *(4.159)*	0.120* *(4.532)*	.127 *(.127)*	.124* *(3.829)*	-0.317 *(1.543)*	1.469* *(4.112)*	.186 *(.684)*	-.229 *(.792)*
Sex	-0.434 *(2.950)*	0.204 *(0.580)*	-0.417 *(2.543)*	-0.354 *(1.840)*	1.022*** *(13.814)*	0.258 *(0 .925)*	-1.610* *(8.152)*	.536 *(.871)*	0.011 *(0.383)*	-.181 *(.193)*	-.889 *(4.593)*	-.985* *(5.722)*
Age	-0.04* *(3.852)*	-0.52* *(6.162)*	0.017 *(0.683)*	-0.043* *(4.503)*	0.000 *(0.021)*	0.036 *(2.841)*	-0.040 *(1.243)*	0.105 *(8.455)*	1.264** *(10.624)*	.013 *(.204)*	-.033 *(1.490)*	-.009 *(.104)*
Income	0.589* *(4.118)*	0.813* *(4.238)*	1.564** *(10.524)*	1.219* *(8.228)*	0.286 *(0.460)*	1.689** *(12.271)*	2.259* *(3.894)*	-1.214* *(3.601)*	0.338* *(6.945)*	-2.704** *(11.319)*	1.527* *(5.861)*	2.037** *(10.831)*
Education	2.249* *(3.884)*	0.066 *(0.008)*	-1.038 *(1.949)*	0.303* *(0.177)*	0.016 *(0.009)*	-1.038 *(1.949)*	-1.996 *(2.150)*	.240 *(.068)*	-1.466 *(1.925)*	.126 *(.051)*	.532 *(.950)*	-.705 *(1.135)*
Constant	-1.996 *(2.150)*	-1.017 *(0.890)*	-1.477 *(1.935)*	-0.314 *(0.111)*	-1.021 *(1.870)*	-1.477 *(1.935)*	-1.220 *(1.231)*	-5.424 (10.317)	-0.433 *(1.435*	1.886 *(1.674)*	1.227 *(1.335)*	-.976 (.479)
Pseudo R-Square : Nagelkerke	0.334	0.342	0.242	0.332	0.449	0.471	0.631	0.491	0.271	0.336	0.361	0.258

"$^{*}p < 0.05$. $^{**}p < 0.01$."

"Wald-values in parenthesis"

We further find that the use consumers who use equity crowdfunding platforms (ECF) and Peer-to-peer (P2P) Lending services are more likely to save, invest and borrow using FinTech services and platforms. We also find income to be an important factor that influence savings, borrowing and investment through FinTech platforms.

4.4.3 The Effect of FinTech on Traditional Banks

It is an undisputable fact that the past decade has seen a significant growth in FinTech innovation across the globe. FinTech firms and other MNOs continue to introduce innovative financial products for both the unbanked and the financially excluded. Even though traditional players in the financial space, such as banks, have adopted some of these technologies, they have slowly embraced these new innovations (Brandl and Hornuf, 2017). Some banks are still operationally inefficient, sticking to their old-fashioned and cumbersome services, despite the evolution of FinTech technologies. Thus, it is not surprising that some of the activities of these banks are gradually being chipped away by FinTech firms. However, the extent to which FinTech activities are influencing traditional banks is an empirical question that requires answers. In this regard, the third objective of the study sought to examine the impact of the activities of FinTech firms and other MNOs on the performance of traditional banks.

Against this backdrop, we investigate the hypothesis that the growth of FinTech will have a significant negative effect on the performance of traditional banks. To test this hypothesis, survey data was used. The data was obtained from commercial officials of the selected countries. Specifically, the survey sought to determine the extent to which FinTech growth over the past decade has affected the structure, efficiency, market share, and general

performance of traditional financial institutions. A survey of bank officials was used to achieve this objective. Structured questionnaires were administered to bank officials across four African countries using Google forms. The questionnaires were designed based on existing literature reviews and input from experienced bank officials who have an understanding of the FinTech ecosystem. The survey approach was deemed appropriate within the context of SSA due to the unavailability of data on FinTech-related issues. A total of 300 bank officials were targeted to complete and return the online questionnaires. However, 142 respondents successfully participated in the study. Out of these number, 132 responses were deemed usable as 10 responses for various reasons. Thus, a response rate of over 50% was achieved, which was deemed successful given that an online survey usually records low response rate. The questionnaires are categorized into two main sections: The first part elicits demographic characteristics of respondents, which include age, sex, experience, and job position, among others. The second part asks questions about the wide range of issues that relate to FinTech growth within SSA. These statements bothered on issues such as the growth of FinTech, implication of FinTech on bank performance, perception of consumer adoption/usage of FinTech services, and regulation of FinTech. There are ten statements that bothered the respondents' view on FinTech adoption; eight on the growth of FinTech growth; and seven on the implication of FinTech on banks. With the exception of the demographic questions, all other statements were presented on a "five-point Likert scale". Both descriptive and correlational analysis were conducted to establish the association between FinTech growth/development and the performance of banks.

4.4.3.1 Analysis of Demographic and General Characteristics of Bank Respondents

Of the 132 valid respondents, 96, representing 72.7%, are males, while the remaining 36 (27.3%) are not. With regards to the educational background of the respondents, the majority of the respondents (66.7%) have obtained their master's degree, 30.3% have bachelor's degree qualifications, and the remaining 3% have other qualifications. The result also shows that the majority of the respondents are between the ages of 26 and 35. This group constitutes 64.4% of the respondents. Also, 18.9% are between the ages of 25 and above, 9.8% are between the ages of 46 and 55, whereas 6.8% are between the ages of 36 and 45. With regards to the experience of the respondents, the majority of them have worked as bankers for between 6 and 10 years. This category of respondents represents about 62.1% of the total respondents. 25.8% of the respondents have had between 1 and 5 years of banking experience, whereas 12.1% of the respondents have had over 11 years of experience. Overall, the average working experience of the respondents is 7 years. This result is presented in Table 4.24 below.

Table 4.24 Demographic Characteristics of Bank Respondents (132)

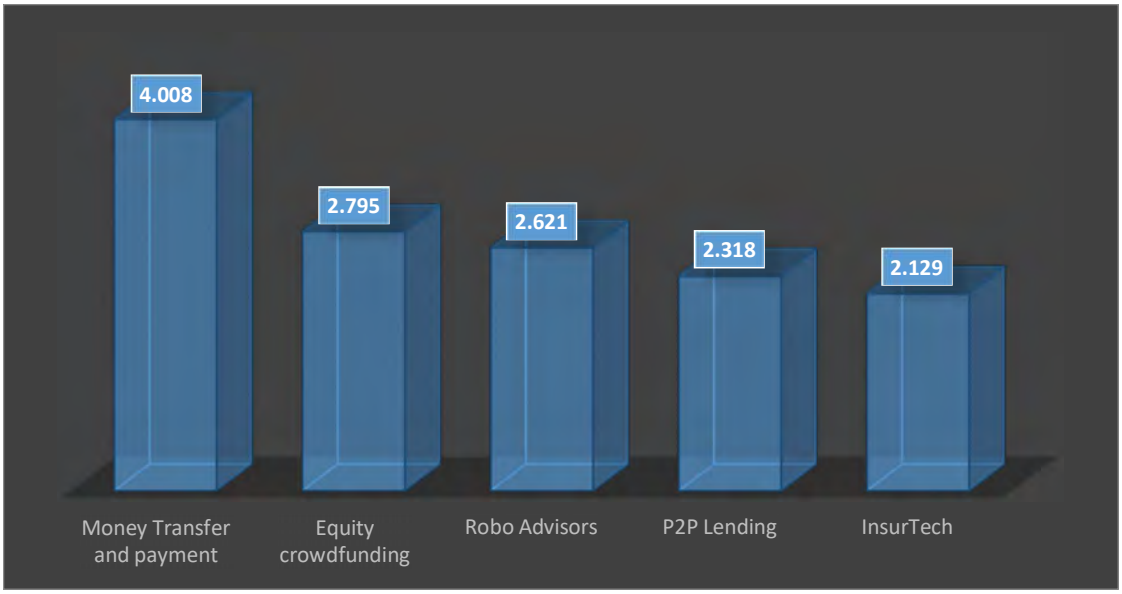
Variable	Categorization	Frequency	Percentage
Gender	Male	96	72.7%
	Female	36	27.3%
Age group	25 and below	25	18.9%
	26-35	85	64.4%
	36-45	9	6.8%
	Above 45	13	9.8%
Education	Bachelor's Degree	40	30.3%
	Masters	88	66.7%
	Other	4	3.0%
Country of Residence	Ghana	43	32.6%
	Nigeria	34	25.8%
	Kenya	26	19.7%
	South Africa	29	22.0%
Experience	2 years and below	5	3.8%
	3-6 years	63	47.0%
	7-10 years	49	37.1%
	11-15 years	16	12.1%

4.4.3.2 Views regarding the Popularity and Usage of FinTech Models

There are a number of FinTech platforms delivering a variety of FinTech services. We focused six main FinTech platforms, which include money transfer and payment FinTech (MPT), Equity Crowdfunding (ECF), Robo-Advisors, (RAD), Peer-to-Pear platforms (P2P), and InsurTech (INS). The participants were requested to indicate (rank the usage and popularity of the main FinTech platforms) the extent to which these platforms are used by financial consumers. Figure 4.9 presents the mean ranking of the various FinTech platforms, with the minimum being 1 and the maximum being 5. The result clearly indicates that money transfer and payment FinTech are the most popular

FinTech models among the various FinTech platforms. Per the responses, InsurTech is the least used FinTech platform as far as the responses are concerned.

Figure 4.9 Mean Ranking of various FinTech Platforms in terms of usability (N=132)



Source: Researcher's construct, 202

4.4.3.3 Growth in FinTech Innovations

The views of the bank officials were also sought regarding the growth of FinTech in SSA. From the estimated results, it can be seen that significant investment has gone into FinTech services in the past decade. The metrics used to assess the growth of FinTech include investment growth, growth firms operating as FinTechs, expansion in FinTech activities, and expansion in the number of FinTech consumers or users. Respondents were presented with these four statements. The mean of the responses is captured in Table 4.25. From the descriptive statistics presented, it can be observed that respondents significantly agreed with the following statements: significant investment in FinTech (Mean = 4.250; SD = 0.669), significant growth in the number of FinTech firms (Mean = 3.758; SD = 0.974),

FinTech activities expected to continuously expand (Mean = 3.758; SD = 0.839), and significant consumer adoption of FinTech (Mean = 3.636; SD = 0.998)

Table 4.25; Perception of Bank Officials regarding the Growth of FinTech Activities

Statements	N	Min	Max	Mean	S.D
Significant investment in FinTech services	132	3.0	5.0	4.250	.6697
Growth in the number of FinTech Firms	132	2.0	5.0	3.758	.9739
FinTech activities expected to expand	132	3.0	5.0	3.758	.8391
Significant consumer adoption of FinTech	132	2.0	5.0	3.636	.9983

Scale (mean) 0 – 2.5 = low; 2.51 – 3.5 = Average and 3.51 and above = High:

4.4.3.4 Implications of FinTech activities on Traditional Banks

Seven sets of statements were also used to elicit the views of respondents regarding the implications of FinTech growth and development for traditional banks. The statements focused on issues such as the effect of FinTech on the customer base of banks, the effect on financial performance, the effect on lending, the extent to which FinTech firms pose a threat to traditional banks, the influence of FinTech on the market share of traditional banks, and the extent to which FinTech has reduced new accounts and customers for the banks, among others. Again, the statements were presented on a 5-point Likert-Scale format, ranging from 1 = strongly disagree to 5 = strongly agree". The analysis of the responses is captured in Table 4.26.

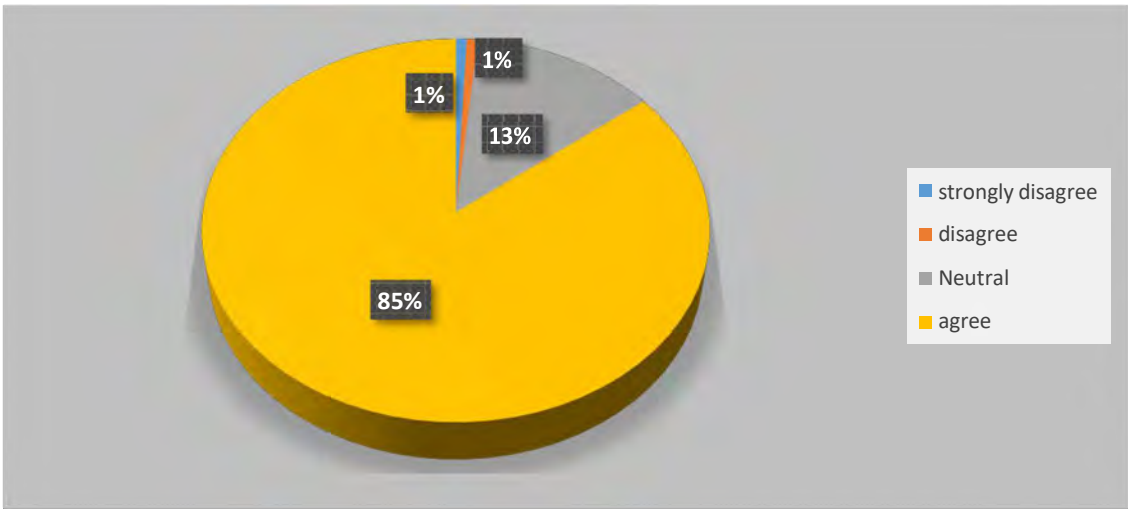
Table 4.26: "Descriptive analysis of the implication of FinTechs/MNOs on Banks"

Statement	N	Min	Max	Mean	SD
Reduction in customer base due to FinTech	132	2.0	4.0	3.348	0.38
FinTech is a threat to traditional banks	132	1.0	4.0	3.833	0.44
FinTech is a disrupter of traditional banking activities	132	1.0	5.0	3.856	1.02
Financial performance down due to FinTech	132	2.0	5.0	2.235	0.82
FinTech has reduced the market share of banks	132	2.0	4.0	2.386	0.78
Number of account creation reduced due to FinTech	132	1.0	4.0	2.235	1.09

Scale (mean) 0 – 2.5 = low; 2.51 – 3.5 = Average and 3.51 and above = High:

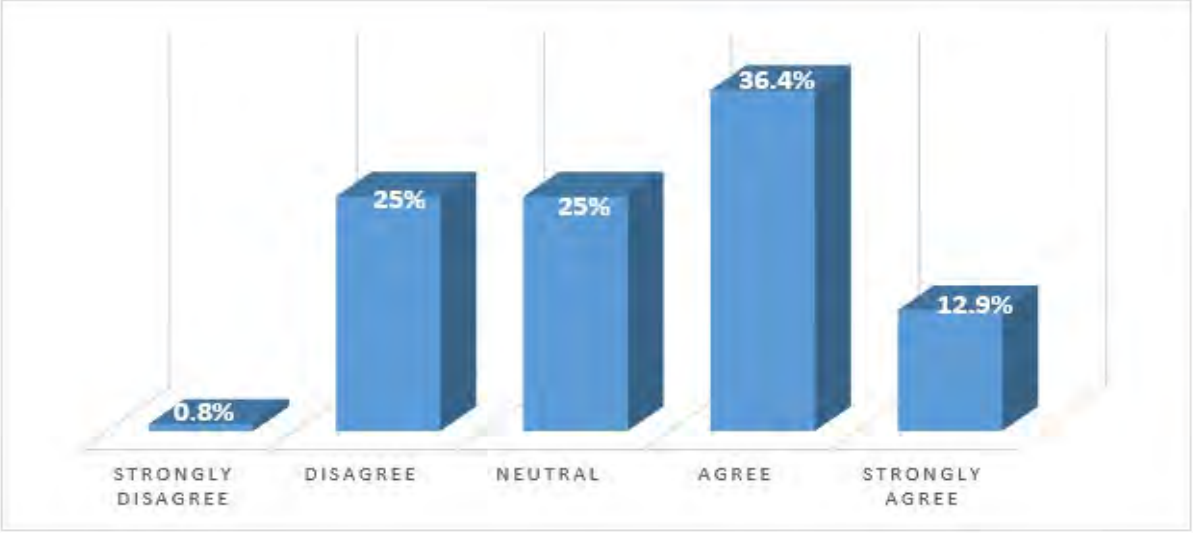
From the results presented in Table 4.24, we observed that respondents are not too sure whether FinTech has had an impact on the customer base of traditional banks. However, they are sure that FinTech poses a threat to the activities of traditional banks (Mean = 3.833, SD = 0.44). They also agree that FinTech could disrupt the activities of traditional banks (Mean = 3.856, SD = 1.02). They, however, seem to disagree that FinTech activities have (1) reduced the market share of banks, (2) reduced the number of accounts created, and (3) affected the financial performance of traditional banks. For instance, out of the 132 respondents who participated in the survey, 85% of the respondents actually indicated that they agree with the statement that FinTech poses a threat to traditional banks. 13% neither agree nor disagree with the statement, while 2% disagree with the statement (See Figure 4.10).

Figure 4.10: View of respondent on threat posed by FinTech activities to banks



Also, from the analysis captured in Figure 4.11, significant number of the respondents supported the statement that FinTech is a threat to traditional banks, while 12.9% strongly agreed with the statement. However, 25% and 0.8% of the respondents disagreed and strongly disagreed with the statement. 25% of the respondents neither agreed nor disagreed with this statement.

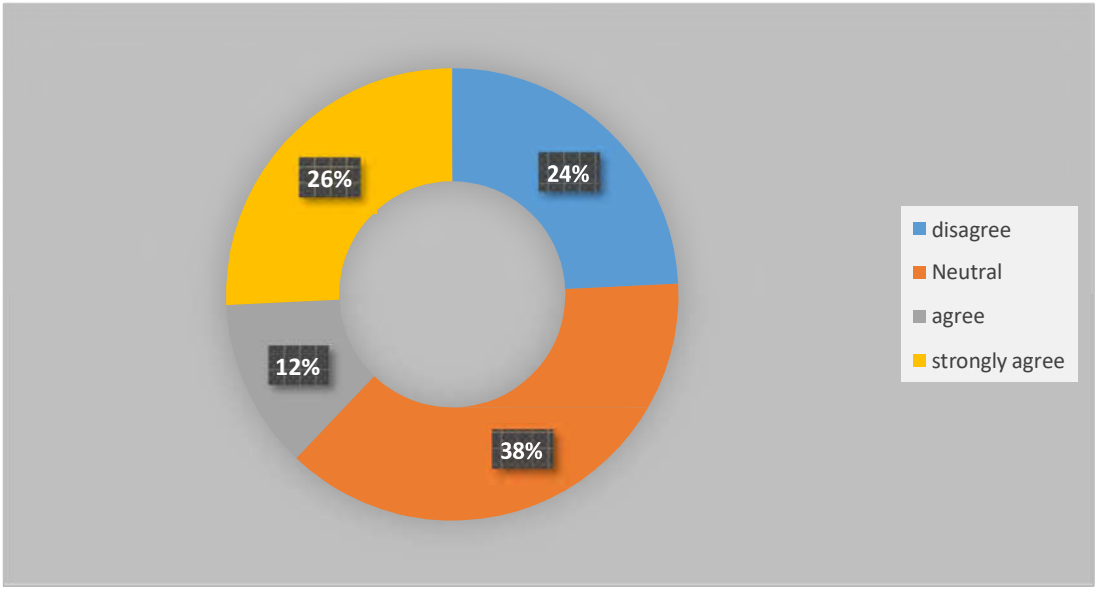
Figure 4.11: Respondents view on the disruptive nature of FinTech



4.4.3.5 Collaboration with FinTech Firms/MNOs

The questionnaires also elicited the views of bank officials regarding collaboration between banks and FinTech/MNOs. The statement that "*there is strong collaboration between banks and FinTech firms/MNOs*" received diverse responses. From the results presented in Figure 4.12, 38% of the respondents agree that there is strong collaboration between existing traditional banks and FinTech/MNO firms.

Figure 4.12 Respondents views on the extent to which FinTech firms are collaborating with banks



Source: Researcher's own construct

4.4.3.6 SEM Analysis of the effect of FinTech on Banks

A structural equation model (SEM) was applied to investigate the effect of FinTech growth and development on the performance of banks. The dependent latent variable (bank) performance was measured by three items based on balanced score card dimensions. These dimensions include finance, internal processes, growth, and customers. The

independent variable is the growth of FinTech, and it is measured by three dimensions, which are adapted from the FinTech growth and development indices by the Global FinTech Index. These measures include the quantity of FinTech firms and products, the quality of FinTech delivery, and the quality of the infrastructure and regulatory framework. The mediating variable, which is FinTech usage, has four dimensions, which are the actual use of FinTech services. All three variables were measured by applying "a 5-point Likert scale". Where 1 implies strongly disagree, and 5, strongly agree.

4.4.3.7 Data Accuracy

The reliability of the constructs was examined using Cronbach's alpha, the result of which is presented in Table 4.27. Bank performance, FinTech growth, and FinTech usage are measured using 4, 2, and 5 items, respectively. The result shows that all the variables/constructs have Cronbach's alpha values exceeding 0.7, which is the threshold for determining the reliability of the construct (Palant, 2011). Based on this outcome, we may intimate that there is internal consistency or reliability with regards to the various constructs used. The reliability of the constructs was also assessed using composite reliability. From the test results captured in Table 4.27, we observe that all the constructs have CR values exceeding 0.7, which demonstrates that internal consistency exists among the items measuring each of the constructs.

In addition to Cronbach's alpha, which was used to assess the reliability of the constructs, other validity measures were also used. This was done to ensure that the model estimation and its outcome were reliable and valid and could be relied upon to make a valid conclusion. Other measures of validity and reliability include average variance extracted

(AVE) and factor loading. The estimates of these parameters are shown in Table 4.27. The result shows that the items load well on their respective factors. This is because the outer (factor) loadings exceed 0.6 in all cases as prescribed by Palant (2011) and Hair et al. (2014). Again, the average variance extracted exceeds 0.7 in all three constructs.

Table 4.27: "Reliability and Validity of Constructs"

Construct	Indicators	Loadings (λ	Cronbach's Alpha	CR	AVE
Performance	PFM1	0.905	0.863	0.896	0.685
	PFM2	0.838			
	PFM3	0.827			
FinTech Growth	FGW1	0.876	0.877	0.916	0.731
	FGW2	0.763			
	FGW3	0.894			
FinTech Usage	USG1	0.918	0.883	0.919	0.740
	USG2	0.900			
	USG3	0.817			
	USG4	0.798			

Source: Researcher's own construct, 2022

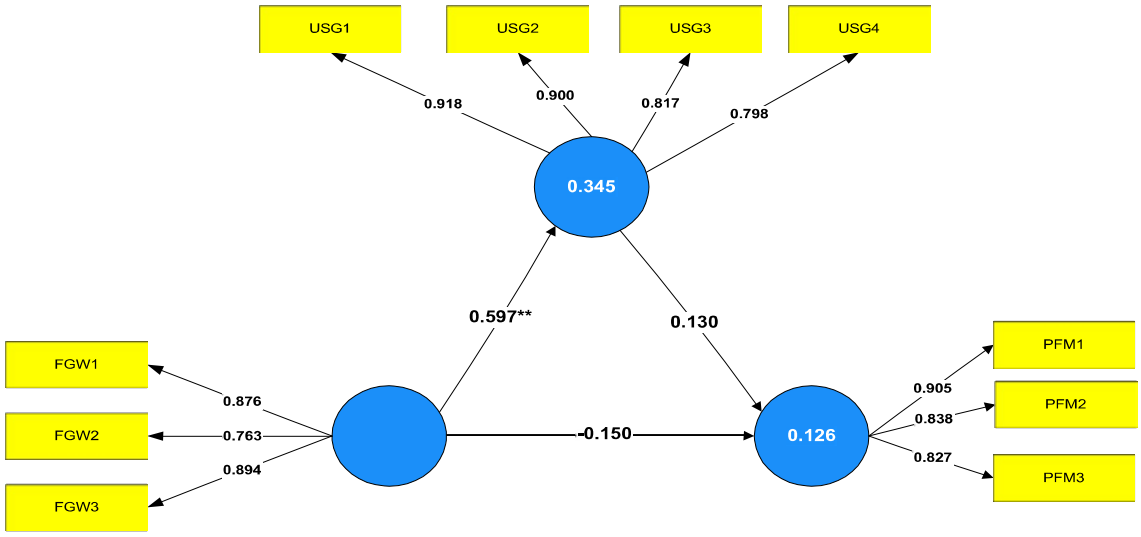
4.4.3.8 Estimation of Structural Model

As indicated previously, the model was estimated using SEM with the use of SmartPLS software. Figure 4.13 and Table 4.28 provide the summary of the results of the SEM analysis. In Figure 4.13, the blue circles represent the latent variables, whereas the yellow rectangles are the measurement items. The outer factor loading is represented by the arrows pointing to the measurement items. The values in the blue circles indicate the R-square values, while the values on the arrows linking the blue circles represent the

regression coefficients. Table 4.28 gives a detailed picture of the association between the outcome variable and the predictor variables. It is observed that FinTech growth has a positive and significant effect on FinTech usage ($\beta = 0.597, t = 7.554, p = 0.001$). Which means that growth in the FinTech sector spur significant usage of FinTech products. However, the relationship between FinTech growth and bank performance is not statistically significant ($\beta = 0.345, t = 1.459$). This result shows that our sample data does not provide significant proof to the effect that FinTech has any impact on the performance of traditional banks. We also investigated the mediating role of FinTech usage in the relationship between FinTech growth and bank performance. From the result, it can be observed that the effect of FinTech growth on bank performance through FinTech usage ($FGW \downarrow\downarrow\rightarrow USG \downarrow\downarrow\rightarrow PFM$) is not statistically significant ($\beta = -0.150, t = 0.880, p = 0.379$). This

result implies that FinTech usage (USG) does not significantly mediate the relationship between FinTech growth and the performance of traditional banks.

Figure 4.13: Result of Structural model



**Coefficient significant at 0.01

Source: Researcher's own construct, 2022

Table 4.28 Direct and indirect relationship between variables

Path	Hypothesis Effect	Original Sample	Sample mean (M)	Standard Deviation	T-statistics	P values
FGW → PFM	Direct Effect	-0.150	-0.117	0.171	0.880	0.379
FGW → USG	Direct Effect	0.597	0.601	0.079	7.554	0.000
USG → PFM	Direct Effect	0.130	0.129	0.140	0.933	0.351
FGW → USG → PFM	Mediation Effect	0.078	0.078	0.088	0.887	0.376

Source: Researcher's Construct, 2020

4.4.3.9 Summary of Hypothesis 3 Testing

Based on the above result, the hypotheses of research question three are summarized as follows:

Table 4.29 "Summary of Hypotheses testing"

Relationships (Hypothesis)	Findings
FinTech Growth/Development Has negative effect on Bank performance	Not supported
FinTech usage has significant effect on Bank performance	Not supported
FinTech growth significantly influences FinTech usage	Supported
FinTech usage significantly mediates the relationship between FinTech growth and traditional bank performance	Not Supported

Result of Secondary data analysis

To estimate the panel regression model, a determination was made regarding the nature of the data and the suitable technique to adopt. Panel regression is often estimated using either fixed or random effect techniques. To determine the suitable technique to employ, Hausman's test was conducted (Hausman, 1978). We observe that the random effect model was suitable for the current data, and therefore it was applied to estimate the coefficients.

The analysis of the data was done using EViews statistical software. The panel regression estimates for the two models are illustrated in Tables 30 and 31. The first model applies ROA as the dependent variable, and the second model applies ROE as the dependent variable. In both models, FinTech growth or adoption, as proxied by the volume of mobile payment transactions and the number of active mobile money users, has no significant effect on the performance of the banks. The findings are largely consistent with the survey data analysis, which also revealed a lack of significant influence of FinTech adoption on traditional bank performance.

It is further demonstrated that bank size, measured by the logarithm of total assets, has a significant positive effect on bank performance in both models, implying that the larger the bank, the better the performance. Again, GDP growth was also found to be a significant predictor of bank performance. However, inflation and deposits were found to be insignificant predictors of bank performance in both models.

Table 30: Panel regression result with ROA as Dependent Variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MobA	6.07E-09	5.26E-09	1.155230	0.2522
MobT	-2.77E-07	1.78E-07	-1.560940	0.1234
SIZE	0.003700	0.001053	3.513916**	0.0008
INF	0.000631	0.000685	0.921717	0.3596
DPSIT	1.67E-12	4.89E-12	0.342341	0.7331
GDP	0.001735	0.000698	2.486612*	0.0151

* and ** indicate coefficient significant at 0.05 and 0.01 respectively

Table 31: Panel regression result with ROE as dependent variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MobA	8.26E-09	5.13E-09	1.610242	0.1120
MobT	-1.55E-07	1.92E-07	-0.808656	0.4215
SIZE	0.023141	0.006707	3.450133**	0.0009
INF	0.005673	0.004362	1.300723	0.1973
DPSIT	-2.01E-11	3.11E-11	-0.644354	0.5213
GDP	0.009882	0.004443	2.224066*	0.0292

* and ** indicate coefficient significant at 0.05 and 0.01 respectively

4.4.4 FinTech growth and regulatory Responses

The rapid growth of financial technology, or FinTech, in Sub Saharan Africa can be attributed to a young and tech-savvy population that is mainly unbanked, as well as strong mobile and internet usage within the SSA region. It is bringing disruptive technologies and creative services to a broad market that has previously been ignored or undeserved by traditional banking and financial services. Whereas FinTech growth within the continent has been impressive and beneficial so far, there are some regulatory challenges that could impede the smooth operations of FinTech services within the region. It is therefore imperative for regulation to keep up with the rapidly changing ecosystem of FinTech innovation.

There is no doubt that FinTech is changing not only the financial landscape but also the regulatory framework governing innovative financial services. In view of this, the focus of the fourth research objective is to examine the regulatory responses to FinTech Growth. This section focuses on the regulatory frameworks of the four leading jurisdictions in terms

of FinTech development in SSA: Ghana, South Africa, Nigeria, and Kenya. This section attempts to answer the question:

To what extent has the growth of FinTech influenced policy and regulatory responses in SSA?

To answer these questions, five main thematic areas were focused on. These include:

a. The application of bespoke regulation for FinTech platforms
b. Availability of innovation offices in response to the growing FinTech environment
c. The use of regulatory sandboxes;
d. The use of technology (RegTech) to regulate the FinTech ecosystem
e. Consumer protection initiatives

Written materials on FinTech regulation, official government publications, central bank reports, the websites of the central banks, as well as publications and other journal articles and responses on the subject are analyzed.,

The analysis is sub-divided into various sections. The first section presents an overview of FinTech regulation in the selected countries: Nigeria, Ghana, Kenya, and South Africa. The second section presents the major regulators within the FinTech ecosystems of the four selected countries. Section three analyses the main FinTech products' availability in these countries. Section four presents the various regulatory frameworks and legislation in response to the growing FinTech ecosystem. Finally, we present the challenges faced by SSA countries in regulating the FinTech environment. In analyzing the regulatory frameworks of these countries, the following questions are posed: How are the various FinTech models regulated in SSA? Which regulators have the requisite mandate to ensure that FinTech services are regulated in the sub-region? Are there specific

regulatory frameworks (bespoke) for individual FinTech products or are existing regulatory frameworks relied upon? What are some of the innovative strategies to improve FinTech regulation in SSA?

4.3.1 Overview of FinTech Environment

Nigeria

The Nigerian FinTech ecosystem has experienced significant growth in the past decade. Despite this growth, the industry is still nascent if it is compared with other countries across the globe. In recent years, consumer acceptance of innovative financial delivery coupled with significant investment in the sector has led to an improved FinTech ecosystem. For instance, Kuda, a FinTech company that specializes in offering mobile banking services, raised funding to the tune of $25 million in 2020. In that same year, a US company acquired a Nigerian FinTech company called Paystack, with the deal hovering around $200 million. It is further envisaged that as the years roll by, the FinTech industry in Nigeria will continue to see significant growth in terms of volume and number of transactions.

In 2012, the FinTech industry began to assert itself in the Nigerian economy. The first endorsement was received by the industry from the Central Bank of Nigeria in 2012, based on the cashless policy being pursued by the central bank. Prior to this period, the Central Bank of Nigeria and other government agencies had tried to introduce policies aimed at improving financial inclusion and reducing the excessive use of cash within the economy. Currently, there are five broad categories of FinTech offerings in Nigeria. These

include digital banking, alternative lending and digital credit, electronic payments, investment and asset management/crowd funding, and blockchain and digital currency.

Currently, alternative lending schemes powered by online platforms have surfaced in Nigeria. These platforms make it convenient for customers to access credit facilities rather than attempting to secure loan facilities from traditional banks. Whereas traditional banking systems required documents to process credit facilities requested by customers, these online platforms and apps use machine learning algorithms to determine the credit worthiness of customers. Some of these alternative lending platforms currently operating in Nigeria include Paylater, Renmoney, and Kiaka and Quickcheck.

Electronic payment platforms have also transformed the manner in which payments and bill collection are done in Nigeria. The development of payment platforms such as Remita, Paga, Paystack, and PayU is gradually replacing the current cash payment system in the country. These companies and non-banking institutions are regulated to provide these services to their customers. Investment management platforms, popularly known as crowdfunding, are also gaining traction within the FinTech ecosystem of Nigeria. The main beneficiary sectors include the real estate and the agriculture sectors. The crowdfunding platform is an avenue for businesses to use either debt or equity to fund their operations.

FinTech models such as P2P lending, equity crowdfunding, and other new models are gradually gaining traction in the financial market of Nigeria. There are also positive practices aimed at safeguarding consumers and ensuring that FinTech innovation thrives. Some of the positive initiatives include electronic know your customer (eKYC), a centralized biometric identification system, and open banking initiatives.

Ghana

Over the past decade, the FinTech sector in Ghana has witnessed significant growth. The sector has permeated all facets of business, including banking, health, and the insurance sectors (Bright, Oten, and Gyan, 2021). Like many SSA countries, mobile payment and transfer FinTech have been dominant among the various FinTech products introduced in the past decade. These platforms are often operated by MNOs and other FinTech providers. These MNOs include MTN Ghana, Vodafone Ghana, AirTelTigo, and mobile money services, which are the dominant FinTech businesses in Ghana. When these MNOs began operations about 10 years ago, they offered a platform for individuals and mobile users to transfer, withdraw, and save money using their mobile networks. Currently, these MNOs and FinTech firms provide additional services that include payment of bills, borrowing, and remittances, among others. Given the massive inroads made by these FinTech firms within the financial arena, it is not surprising that the banking sector has also introduced some innovative products aimed at retaining their customers. Some have even taken the decision to introduce mobile money services in an alliance with some MNOs to enhance their operations. For example, GT Bank Ghana and Fidelity Bank Ghana have both partnered with Express Pay to provide mobile money services to customers. A survey conducted by the Bank of Ghana revealed that there were 14.7 million mobile money accounts as of May 2020 (Bright, Oteng, Gyan, 2021).

According to a recent Bank of Ghana Economic and Financial Data report, the number of active mobile money users rose to 401 million in December 2021, with a total value of transactions of GHS82.9 billion. Aside from the growth of the mobile money payment and transfer platform, there are other FinTech services that have been gaining

traction in recent years. The crowdfunding platform, robo-advisors platform, insurance FinTech and crypto currency platforms are also gaining acceptance among Ghanaians.

Kenya

FinTech in Kenya has expanded in leaps and bounds since it was first introduced in 2007 through the M-Pesa platform. The M-Pesa platform, which offered money transfer and withdrawal using mobile telephony, revolutionized the way individuals and businesses accessed financial services. Today, a variety of FinTech products and models are currently being offered in that country. When it comes to FinTech in SSA, Kenya stands out as a major FinTech hub (Didenko, 2018). Many countries in SSA have adopted some of the regulatory frameworks from Kenya in developing their own frameworks. The manner in which FinTech is regulated can be traced to the regulatory regime adopted to regulate the mobile payments platform in Kenya. The country has largely adopted the "test and learn approach," which involves understanding the FinTech model with the view of designing a bespoke regulatory framework for it. The test and learn approach has eventually led to the formulation of dedicated regulatory frameworks for different FinTech models.

Despite its leadership within the FinTech ecosystem in Kenya, there is no specific and overarching framework for regulating FinTech in Kenya. As in the case of many African countries, the regulatory regime is fragmented. This means that specific sectors are required to regulate the FinTech ecosystem instead of a dedicated framework (Didenko, 2018).

South Africa

The FinTech sector in South Africa has been developing significantly over the past decade. Although the financial system of SA is well-developed compared to other SSA countries, there is still a craving for technology to improve financial inclusion in the country. There are four major institutions or entities that are focused on regulating the financial sector, including FinTech firms and MNOs. These include the "South African Reserve Bank, the financial sector conduct authority, the national credit regulator, and the Financial Intelligence Centre (FIC)". Like in many African countries, the SARB is the main regulator of the financial sector, which is made up of the banking sector and payment services. They have a mandate to regulate and enforce financial policies on all financial services in the country. The FSCA has a mandate to regulate the conduct of financial institutions such as stock brokers, investment schemes, FinTech firms, investment advisory schemses, fund managers, stock exchanges, among others. The NCR is more focused on regulating the lending sector. The NCR has the mandate to regulate entities such as credit bureaus, debt collectors, and peer-to-peer lending. The Financial Intelligence Centre is also mandated to ensure that anti-money laundering policies and regulations are complied with.

Payment FinTech is the major focus as far as FinTech activities are concerned in South Africa. Over the past decade, various banks and non-bank entities have applied and received authorization to introduce payment and money transfer platforms. In addition to the payment sector, which dominates the FinTech market, peer-to-peer lending and crowdfuding ("alternative funding through digital platforms") also dominate. There is also growing interest in cryptocurrency, even though the regulator has raised concern about the potential risk in that area.

Analysis of Major Regulators (Regulatory bodies) within the FinTech Ecosystem

A cursory analysis of existing documents on FinTech regulation indicates that in SSA, the majority of FinTech products do not have specific regulatory frameworks or bespoke regulations. These countries mostly rely on existing regulators within the financial space. Table 4.32 presents the various FinTech regulators and the corresponding countries that use these regulators. We observe that all the countries (Nigeria, Ghana, South Africa, Kenya) have their FinTech environment regulated by their respective Central Banks. These central banks are responsible for issuing licenses and policy guidelines to these firms. In addition, they coordinate all activities relating to monitoring and supervision.

Table 4.32 presents the regulatory bodies relied upon by the four jurisdictions to regulate the FinTech ecosystem. For instance, in Ghana the Central Bank (Bank of Ghana), the cyber security agency, the data protection commission, the Securities and Exchange Commission, the financial intelligence commission, the insurance commission, and the ministry of information and communication are the main bodies mandated to regulate the innovative financial sector, including FinTech firms and MNOs. South Africa also relies on the central bank and other bodies such as the "prudential authority, the financial sector conduct authority, and the national credit authority".

Table 4.32: FinTech Regulators

	Ghana	Nigeria	South Africa	Kenya
Central Banks (Federal Bank)	√	√	√	√
Cyber Security Agencies		√		
Data protection Commission	√	√		
Securities and Exchange commission (capital market authorities)	√	√		√
Financial intelligence Centre	√			
Insurance commission	√	√		√
Information Ministry	√			√
Competition Authority				√
Prudential Authority			√	
Financial sector conduct authority			√	
National Credit Authority			√	

Main FinTech Products in the Selected Countries

A cursory review of existing documents indicates that even though there are numerous FinTech platforms offering diverse financial services in SSA, six main platforms stand out in the surveyed jurisdictions. We observe that money transfer and payment FinTech, equity crowdfunding, peer-to-peer lending, Robo-Advisors, and crypto-currency are the main platforms that have gained currency in recent years. These platforms are presented in Table 4.33.

Table 4.33: Main FinTech Products

	GH	NG	SA	KN
Money Transfer and Payment	√	√	√	√
Equity Crowdfunding	√	√	√	√
Peer-to-Peer Lending	√	√	√	√
InsurTech	√	√	√	√
Robo-Advisors	√	√	√	√

Source: Researcher's own construct, 2022

In Table 4.33, it is observed that all the major FinTech products are available in all the selected countries. However, the level of usage and the extent to which they are regulated differ from one jurisdiction to the next.

Regulation of the main FinTech platforms

The six main and well-known FinTech platforms are regulated in various ways. Some of these platforms have their own specific or bespoke regulatory policies, while others are regulated through general sector frameworks. Others are also not regulated at all or are self-regulated. Figure 4.14 presents the various FinTech platforms and the nature of their regulations.

Figure 4.14 Regulation of FinTech platforms in selected jurisdiction of SSA.

	Money transfer and payment	***Equity Crowdfunding***	***P2P Lending***	***InsurTech***	***Crypto-Currency***	***Robo-Advisors***
GH	FinTech Specific Framework	General Sector Framework	General Sector	Unregulated or self-Regulated	Unregulated or self-Regulated	General Sector Framework
NG	FinTech Specific Framework	General Sector Framework	General Sector Framework	General Sector Framework	Unregulated or self-Regulated	General Sector Framework
KN	General Sector Framework	General Sector Framework	General Sector Framework	General Sector Framework	Unregulated or self-Regulated	FinTech Specific Framework
SA	General Sector Framework	General Sector Framework	General Sector Framework	General Sector Framework	Unregulated or self-Regulated	General Sector Framework
Region Mode	FinTech Specific Framework	General Sector Framework	General Sector Framework	General Sector Framework	Unregulated or self-Regulated	General Sector Framework

In Figure 4.15, we examine the various FinTech products and the nature of their regulation in the selected jurisdictions. We look at those that are regulated by general sector regulation

or framework, those that are regulated by FinTech Specific Frameworks (Bespoke), and those that are unregulated or self-regulated. We examine regulatory regimes for the four selected countries as well as the situation as it pertains in the sub-region. The results indicate that with regards to crypto-currency, all the countries investigated have an unregulated regime for this particular FinTech product. In addition, the regional mode also suggests that virtually all the countries within SSA are yet to either issue a general sector framework to regulate crypto-assets or have a specific regulatory regime for them. This is in sharp contrast with e-money (Mobile FinTech), where all countries, with the exception of Kenya, have bespoke regulatory frameworks. The regional mode also indicates that MTP is generally regulated by bespoke regulation.

Existence innovation offices

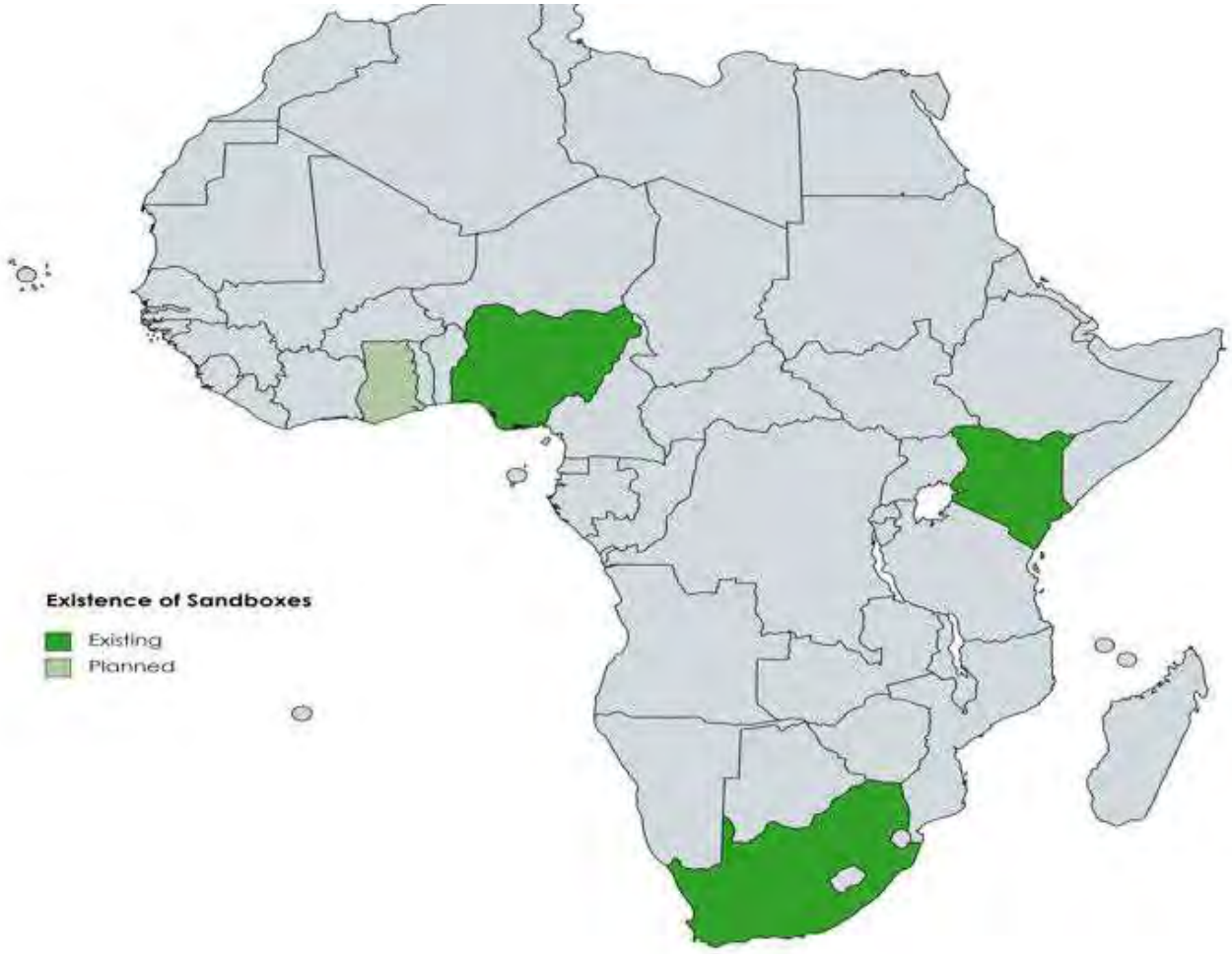
Figure 4.16 depicts the countries in SSA that have innovative offices and those that do not. A cursory look indicates that all the selected jurisdictions (Ghana, Kenya, Nigeria, and South Africa) have innovative FinTech offices. In addition to these countries, only two other SSA countries, Angola and Rwanda, have these FinTech offices.

Figure 4.15: Existence of Innovation offices

The availability of these offices is designed to support innovation within the FinTech space while, at the same time, working in conjunction with other bodies to protect consumers and safeguard the integrity of the financial system. For instance, in 2020, the Central Bank of Ghana, also known as the Bank of Ghana (BOG), set up an innovation office with the mandate to oversee the licensing of FinTech companies engaged in payments in all forms. The focus of the office is to promote the government's digitization agenda, which is intended to promote a cash-lite economy and financial inclusion, while at the same time protecting consumers from possible risks associated with FinTech activities.

Availability of Regulatory Sandboxes

Figure 4.16: Countries with Regulatory Sandboxes



In Figure 4.16, the four jurisdictions surveyed are depicted on the African Map. It can be observed that Nigeria, South Africa, and Kenya have introduced regulatory sandboxes aimed at providing an opportunity for FinTech firms to start operations with real customers while at the same time monitoring their activities. These "regulatory sandboxes" are intended to promote FinTech products and services while protecting

consumers and ensuring financial stability. For instance, Kenya is among the few countries in SSA with a regulatory sandbox. This sandbox is designed to support FinTech firms to introduce their innovative products without going through the laborious processes of getting their business processes recognized and registered. In Ghana, even though the country does not have an existing "regulatory sandbox", there is a plan to institute one to regulate the activities of FinTech firms.

Availability and use of Regtech

Regulating FinTech firms has become easier with the introduction of technology to regulation. The application of supportive technologies to ensure that FinTech firms are complying with regulatory requirements. The purpose of this technology is to support FinTech firms, MNOs, and other companies that are monitored to ensure that they are not doing anything that could jeopardize the privacy and financial integrity of consumers. We observe from the document analysis that all the countries examined have at least one regtech or supertech initiative that has been implemented to promote the regulation of FinTech within their respective ecosystems.

Consumer Protection Initiatives

In addition to the various initiatives to ensure that FinTech supports financial inclusion, there are other policies that are designed to protect consumers, prevent cybercrime within the FinTech space, minimize the use of digital platforms for anti-money laundering purposes, improve electronic know-your customer, and provide general consumer protection. A comprehensive review of existing databases and FinTech information across the case study countries (see Table 4.34) revealed that there is almost

complete coverage of these initiatives across all the jurisdictions of interest. Analysis of available information revealed that consumer protection legislation and open banking framework are not currently available in Ghana, even though there are plans to implement these initiatives. Also, South Africa has yet to introduce an open banking framework to support FinTech innovation.

Table 4.34: Initiatives to improve trust in FinTech

	Countries			
	GH	NG	KN	SA
Consumer Protection		✓	✓	✓
Financial Specific Data Protection	✓	✓	✓	✓
Financial Specific Cyber Security	✓	✓	✓	✓
AntiMoney Laundering (AML)	✓	✓	✓	✓
Electrionic Know Your Customer (e-KYC)	✓	✓	✓	✓
Open Banking		✓	✓	
Total	**4**	**6**	**6**	**5**

Source: Researcehr's own construct, 2020

Results of Qualitative Analysis (Interview)

Overview

In this section, we present the responses from the interview with bank and FinTech firm officials on the research topic. The interview data was designed to shed more light on the result of quantitative data and clarify some findings obtained under that quantitative data analysis. A total of twenty-four (24) officials were interviewed separately to gain more insight into the subject matter. Eight of the participants were female, whereas the remaining 16 were female. Twelve respondents were bank officials, and the remaining 12 were

FinTech firm officials. On average, these respondents have 7 years of working experience within the banking/FinTech space, and therefore, they have the requisite understanding of the dynamics within their respective industries since the evolution of FinTech services in SSA. The analysis of the interview from the 24 respondents was important as it led to key insights into the subject of Fintech and its impact on consumers, banks, and the regulatory environment. The responses can be categorised under three overarching themes, which are the focus of this interview presentation. These themes include:

1. Determinants of FinTech Adoption
2. FinTech impact on the banking sector
3. The regulatory responses to FinTech

Factors influencing FinTech adoption

The existing literature has provided some answers to the variables that affect the adoption and use of FinTech services. In research question 1, we empirically examined the determinants of FinTech adoption using quantitative techniques. To further gain additional insight, bank officials were asked to share their views on what they believe are the antecedents of FinTech adoption. In particular, the researchers wanted to know what they thought was driving the popularity of FinTech services.

Question: *What are the positive factors influencing FinTech Adoption?*

The first question sought to investigate the main positive factors affecting the adoption of fintech. Almost all the respondents highlighted *convenience, ease of use, and economic benefits* as some of the main factors driving the adoption of FinTech services. The report indicated that FinTech services like mobile payment and transfer are easily accessible,

irrespective of time and location. Thus, compared to services offered by brick-and-mortar financial institutions, FinTech services are highly convenient. The interviewees asserted that many people are now opting for these FinTech services as a result of the convenience of such services. Respondent **R5** states:

"There are many people using FinTech, especially mobile payment platforms today because of the convenience associated with it. They can access these services at any time and even in rural locations" (Respondent 5, male, 13, June, 2021).

Another respondent (**R2**) also has this to say:

"It is convenient to use these FinTech products. You can use it at any time and at any place. Consider mobile money payments; they are simple to use. You can move money from your account at the bank to the mobile money platform and vice versa seamlessly. It is also less expensive to use these FinTech services (Respondent 2, male, June 14, 2021).

Again, almost all the interviewees touched on the economic benefits of FinTech products and services as a major driver of FinTech adoption. Respondents unanimously indicated that fintech products have lower transaction costs compared to those offered by brick-and-mortar financial institutions. Respondents generally agree that FinTech firms often charge lower fees than traditional banks, allowing consumers to save money on banking and other financial services. In addition, FinTech companies often offer more competitive rates on loans, credit cards, and other financial products, allowing consumers to save money on interest and fees. Again, they explain that FinTech companies have made it easier for consumers to access financial services such as loans, investments, and insurance. These services are often easier to access online or through mobile apps, and they are often more convenient and less expensive than traditional banks.

"It is cheaper to access financial services using FinTech platforms because they offer rates that are lower than that of traditional banks. You also don't need to travel to access these services, and this makes FinTech services quite affordable." (Respondent 2, male, 14 June, 2021).

Another respondent also shares her view on the economic benefit of FinTech:

"You do not need to travel to access your fund, you can get your money using the mobile money system. It is really simple and it reduces the cost involved in travelling an accessing your money. I have FinTech platforms are truly economical." (Respondent 11, female, 14 June, 2021).

Aside from the economic and convenience arguments put forward by respondents, sizeable number of them also cited ease of use a major driver of FinTech adoption. Respondent 16 (R16) captures this as follows:

"It easy to use some of the FinTech services. Take for instance, mobile payment and transfer platforms, it is very easy to transfer and withdraw money with that platform. It is these advantage that has attracted a lot of people to adopt FinTech services". (Respondent 16, female, 18 July, 2021).

Question: What do you consider as the negative factors militating against FinTech adoption?

Despite the positive aspects of FinTech services, there are other factors that could militate against their adoption and usage. As part of gaining broader insight into the possible impediments to FinTech adoption, there was a question that elicited the views of respondents regarding the negative factors that scares consumers from adopting FinTech

platforms. The main concerns raised by respondents centered on privacy, trust issues, lack of regulation and perceived risk factors. On Risk factors, one interviewee has this to say:

". The fear of fraudsters and hackers in the FinTech space is a major factor that prevent some members of the society from adopting FinTech platforms. Since the transaction are performed in the digital arena, many are worried that they may lose money in the process" (Respondent 12, male, 19 August, 2021).

Trust in FinTech operators and agents were also identified by majority of the respondents (R1, R1, R4, R6, R9, R10, R12, R16, R17, R19, R20, R21, R22, R23, R24).

Trust is a major factor in the adoption of FinTech services by consumers. If consumers feel that the services are safe and secure, they are more likely to trust the service and use it. Consumers need to trust that their data and financial information are secure and protected, and that the service is reliable and trustworthy. If they feel that their data is at risk, they are less likely to use the service.

Respondent **R10** put it this way:

"Most of them do not trust the platform and the mobile money agents. It is one thing that is actually affecting FinTech usage in Ghana" (Respondent 10, male, 4th, July, 2021).

Some members are also worried about the lack of regulation. We glean from the responses provided that consumers are without adequate regulation, consumers hesitate to adopt FinTech platforms since they cannot be certain of the security of their personal data or the accuracy of the services that are provided. Furthermore, FinTech companies may be able to take advantage of consumers by charging exorbitant fees or providing services of dubious quality. The lack of regulations can also lead to a lack of trust in the services

provided by FinTech companies, as consumers may not be sure of the reliability of the services provided.

"There is not effective regulation within the sector to protect consumers when things don't go well is also affecting the adoption of FinTech services". (Respondent 15, female, 18 July, 2021).

Respondent 16 provides a summary of the major risk factors impeding FinTech adoption as follows:

"The lack of trust, fraud and system downtime are some of the challenges that put many people off with regards to FinTech adoption. In addition, the lack of effective regulation within the sector is also affecting the adoption of FinTech services". (Respondent 16, male, 19 August, 2021).

Question: ***What is the impact of FinTech on the performance of traditional banks?***

The interview also elicited the views of the interviewees regarding the influence of FinTech growth on the performance of traditional banks. Specifically, the question investigated the extent to which the growth of FinTech has affected profitability and the customer base of the banks. From the responses obtained from the interviewees, it can be deduced that even though FinTech firms and other MNOs are offering some financial services that are traditionally offered by banks, the impact of such activities is not significant on the performance of these banks. Many of the respondents opined that banks have not been slow to adopt FinTech innovations but have rather improved their digital platforms to compete favourably with FinTech firms. Others have also indicated that there has been a strong

collaboration with fintech firms, which is helping both FinTech firms and banks leverage the benefits of FinTech innovations. Furthermore, others claim that FinTech innovation is still in its infancy and, therefore, its impact has yet to be felt. For instance, respondent R4 has this to say:

"I cannot say it is affected it positively or negatively. There are both negative and positive sides to the FinTech growth in Ghana as far as the traditional banking sector is concerned. Somehow, the FinTech companies are offering some of the services that are traditionally reserved for banks. At the same time, banks are also leveraging on the FinTech evolution to improve their services and collaborate with other FinTech firms. As it stands now, there has been no significant impact on the banks. We live to see what the future holds." Respondent 4, female, 12 July, 2021).

Another respondent, R5 shares his views:

"I do not think that it has had a negative effect on the operations of traditional banks. Rather, I can say that through the collaboration we currently have with some FinTech firms and MNOs, it has increased our level of activity, albeit insignificantly. As a result, we must do more to enhance our innovation to compete favourably with these FinTech firms. So far, so good for our bank, in my opinion." (Respondent 5, male, 13, June, 2021

What is the level of Collaboration between traditional Banks and FinTech services

While it has been acknowledged that FinTech firms have been faster in applying innovation within the financial sector, it is also true that traditional banks have made some effort to enhance their services by collaborating with some FinTech firms. To appreciate

the level of collaboration between the FinTech firms and Banks, we posed the following question:

Questions: What is the level of collaboration between your Bank and FinTech Firm?

The responses obtained from these questions suggest that there is strong collaboration between the FinTech firms, MNOs and banks. This has made it possible for all the service providers within the FinTech ecosystem to reap mutual benefits and to enhance the experience of consumers. Respondent 2, explain the collaboration this way:

"We have liaised with some FinTech and MNOs to serve customers within the FinTech space, so the collaboration is there and it is very strong. We intend to partner more FinTech services to deliver quality and convenient financial services to customers" (Respondent 2, male, 14 June, 2021).

Other views of respondents (R7, R11, and R12) that suggest a strong collaboration between banks, MNOs and FinTech firms are captured in Table 4.35.

Table 4.35 Respondent's views on the Level of collaboration with FinTech Firms

Respondent	Quotations
R7	*"We are already collaborating with MNOs and other FinTech firms. It is not easy to transfer money from our bank to one's mobile money platform and from their platform to the bank. This is a start of good things to come"*
R11	*"We are already working with the Telcos and other FinTech firms to enhance our activities. The collaboration will be a win-win affair as we will benefit from customer retention, and the Telcos will also benefit from the transaction fees charged on FinTech services."*
R12	• *Well, there is some collaboration but our bank is yet to link up with other FinTech services. What we are doing is to improve our FinTech infrastructure to improve our service delivery"*

We observe from the responses to the question that there is some form of collaboration between FinTech firms and existing banks. We find that MNOs for instance, are liaising with banks to make it possible for consumers to transfer moneys from their bank account to their mobile money wallets and vice versa. In addition, some banks are improving their digital infrastructure to collaborate effectively with other market players to improve their innovative services.

Regulatory responses to the FinTech Ecosystem

Participants were also requested to share their opinions on the current regulatory framework and how FinTech has elicited regulatory responses from regulatory authorities. Respondents were asked the following question:

Question: How has the regulatory authorities responded to the FinTech growth?

A number of interesting responses were elicited from the interviewees. Generally, respondents believe that more needs to be done by the regulatory bodies responsible for regulating the FinTech ecosystem. They intimate that whereas some effort is being made to improve the regulatory environment, bespoke regulation for specific FinTech platforms should be developed:

"Personally, I think the FinTech environment is still at its infancy so there are few regulations and legislations governing its operations. Currently, most of the legislations are derived from existing legislations on banking and financial services. However, since FinTech firms are different from traditional financial institutions, specific regulations should be designed for the various FinTech platforms." (Respondent 6, Male, 11 August, 2021).

Other respondents also believe that regulatory bodies have done well by having laws that control the activities. of FinTech firms. Respondent **R9** has this to say:

"I think so far so good. There hasn't been a significant disruption in the financial system with the advent of FinTech technologies. However, more laws and regulations are required to protect consumers and the financial system as a whole." (Respondent 7, Male, 11 July, 2021).

Table 4:36 Captures some other responses from interviewees:

Table 4.36: Respondents view on FinTech regulation

Respondents	Quotations
R8	*"The regulation of FinTech is within the purview of the Bank of Ghana so I cannot comment much about it. However, I think more needs to be done in the area of FinTech regulation. Currently, there are issues of the various crytocurrecy firms and the central bank. There must be a regulation to deal with it.*
R17	*"I think so far so good. There hasn't been a significant disruption in the financial system with the advent of FinTech technologies. However, more laws and regulations are required to protect consumers and the financial system as a whole."*
R13	*Well, the Central bank uses various financial legislation to protect FinTech customers. I think more structured regulatory framework designed specifically to regulating FinTech Firms should be instituted."*
	"Well, FinTech, as we all know, comes with its own challenges. The use of technology to deliver financial services is not without regulatory challenges. Whiles some regulatory policies have been initiated within the FinTech space, many of the regulations are existing ones that regulate existing financial institutions. I think there must be special regulatory framework for FinTech platforms given its unique nature"

4.5 Evaluation of Findings

Over the last decade, financial technology, popularly referred to as FinTech, has received significant attention from the academic community, businesses, and regulators. There is no doubt that FinTech will continue to revolutionize the way financial services are designed and delivered. In view of the massive interest in the subject, the current study sought to examine FinTech and its influence on consumer behaviour, traditional banking, and regulatory responses. To achieve this broad aim, four specific objectives were outlined. The first was to examine the factors that influence FinTech adoption in SSA. This specific objective was achieved by formulating thirteen hypotheses and testing same. The second specific objective is to investigate the influence of FinTech adoption on the savings, investment, and borrowing behaviour of consumers. The third assesses the effect of FinTech on the traditional banking industry, whereas the last objective investigates the regulatory responses to FinTech development in SSA. In the previous section, data analysis and interpretation were presented using both quantitative and qualitative techniques. This section presents an evaluation of the findings by discussing the results and situating them within the context of existing knowledge and understanding of the subject. For simplicity purposes, the evaluation of the findings is organized based on the specific objectives of the study.

RQ1: The first research question investigated the drivers and inhibitors of FinTech adoption. To answer this research question, thirteen (13) factors/variables were considered. In the previous section, the analysis of these hypotheses was conducted. This section presents an evaluation of the findings. Before discussing the result of the hypothesis testing, some key general observations are made. Our findings revealed that with the exception of

money transfer and payment FinTech, which have a high adoption rate, all other FinTech services, which were the focus of this study, had an average adoption rate. For instance, the result shows that compared to money transfer and payment FinTech, few people have actually activated and are using Robo-Advisory services, crowdfudning, and other FinTech services. This result is not different from the result of Jung et al. (2017), who observed that despite the benefits associated with the use of robo-advisors and asset management FinTech platforms, they are still under-subscribed. One possible reason for this phenomenon, which is supported by Mollic (2012), is the perceived risk associated with some of these FinTech platforms.

Perceived Usefulness (PUS) is positively related to FinTech adoption

From the result in of the data analysis it was observed that a positive association exist between Perceived Usefulness (PUS) and adoption of to use FinTech services (β=0.309, t=6.466, p=0.001). The implication of this result is that when consumers perceive FinTech services as useful to their cause and that they enhance their work efficiency, they are likely to adopt such services. This result is in agreement with the TAM framework espoused by Davies (1989). He opines that perceived usefulness is one key variable that affect the adoption intention of new technology. The result is also in tandem with the findings of Rhu (2018), who posited that customers will be more ready to adopt FinTech services if such services have a positive impact on their activities. Other empirical studies have also been identified to corroborate the findings from our empirical studies (see Ng and Kwok, 2017; Barakat and Hussainey, 2013).

Economic Benefit is positively associated with FinTech adoption

From the structural equation modelling result, it is observed that economic benefit is a significant determinant of FinTech Adoption among students in SSA (β=0.342, t=7.85, p=0.001). It was further observed that among all the determinants of FinTech adoption, the ECB happens to be the variable with the biggest effect on adoption. The interview responses also strongly corroborate the quantitative finding that economic benefits associated with FinTech usage is one of the key antecedents of FinTech adoption. Almost all interviewees identified perceived economic benefit as a major driver of FinTech adoption. This result clearly shows that consumers consider the economic gains from FinTech services when they are making choices relating to adoption. Given that economic benefit is a very important motivation for the adoption of a particular financial service, it is not surprising that economic benefit is the most significant variable affecting the adoption of FinTech services. The implication of this result is that when a FinTech service is introduced and it offers lower transaction and capital costs compared to existing services, then consumers will be willing and ready to adopt such services. The current findings corroborate a number of studies such as Kuo and Teo (2015) and Mackenzie (2015), who have both suggested that economic benefit is a significant determinant of FinTech adoption among consumers. This result also fit into the innovation diffusion theory by Rogers (2005), which posited that relative advantage or economic benefit of innovation adoption is a major factor that affects adoption. For instance, Maduku (2017) opine that technologies that enhance cost savings and minimize the transaction cost of financial services are likely to be preferred to traditional financial services. This result is further supported by EY (2016) who posits that providing a previously paid-for financial services at no cost or

relatively cheaper prices is making FinTech services the preferred choice for consumers and this is creating disruptions within the financial services.

Perceived ease of use is positively associated with FinTech adoption

Perceive ease of use of FinTech services was also identified as a significant determinant of adoption (β=0.317, t=7.659, p=0.001). This result indicates that in determining whether to adopt or use a particular FinTech service, consumers highly consider how easy it is to use such a product or service. Aside from the quantitative result which found perceived ease of use as a major driver of FinTech adoption, the qualitative result also gives credence to this finding. Again, this result corroborates the TAM theory by Davies (1989) and other empirical studies such as Chau and Ngai, (2010), Akturan and Tezcan (2012), and Szopinski (2016).

Convenience associated with FinTech services positively influence its adoption

The empirical model also tested the hypothesis that convenience associated with FinTech services positively influences adoption. CVN and ADP were found to have a strong positive relationship (β = 0.280, t = 7.432, p = 0.001). Convenience also identified by respondents to be one of the major positive drivers of FinTech adoption based on the qualitative data. This result implies that when a FinTech service offers benefits that allow consumers to undertake financial transactions at any time and location, then such a service will receive the required acceptance from consumers. This is also in line with the findings

of Kuo and Teo (2015) and Sharma and Gutiérrez (2010), who observed that convenience is a major factor in FinTech adoption.

Awareness/Knowledge of FinTech positively influences adoption

In the empirical analysis, the expectation was that knowledge/awareness of FinTech services will have a significant influence on FinTech adoption. However, the result of the analysis revealed otherwise. It was observed that knowledge or awareness of FinTech is not a significant determinant of Hypothesis five postulates that knowledge of FinTech services is a significant positive determinant of their adoption. From the empirical model, the p-value is 0.276, which is greater than 0.05. This result implies that we failed to reject the null hypothesis and conclude that there is no significant relationship between AWN and ADP. In other words, H5 is not supported under this empirical model.

Financial Risk (FRK) is negatively associated with FinTech adoption

The empirical model also investigated the extent to which financial risk affects the adoption of FinTech services among our student sample. The result from the structural equation modelling indicates that financial risk is not a significant determinant of FinTech adoption (β = -0.029, t =0.789, p = 0.430). In other words, the fear of losing some funds through the use of FinTech was identified as an insignificant factor as far as FinTech adoption is concerned. The result indicates that the possibility of losing some money as a result of activating and using FinTech services is not a major hindrance to the adoption of FinTech services. The result is at variance with the findings of Forsythe et al. (2006), Rhu

(2018), and Melewar et al. (2013). These studies have found that awareness of FinTech is a significant determinant of adoption.

Security risk negatively influence FinTech adoption

According to the estimated empirical model, security risk has a negative impact on FinTech adoption (β =-0.181, t = 4.084, p = 0.001). The results suggest that potential losses that are likely to be incurred due to fraudulent activities of hackers and crackers could negatively affect the adoption of FinTech services. While this finding in agreement with previous study by Stewart and Jurgens (2018), Rhu (2018), and Meyliana et al. (2018), it contradicts the findings of other empirical studies that have found security risk to be an insignificant determinant of FinTech adoption (see Kim et al. 2016; Fernando et al. 2019).

Operational risk negatively influences the adoption of FinTech products

Another type of risk that was considered for its influence on FinTech adoption is operational risk. Based on the literature and other empirical studies, we postulated that operational risk will have a significant negative influence on FinTech adoption. Our results from the empirical analysis indicated that, indeed, there exists a strong negative relationship between operational risk and the adoption of FinTech services (β= -0.120, t = 3.969, p = 0.001). This result implies that if consumers are not convinced that there are adequate internal systems and processes within FinTech companies or MNOs to swiftly deal with possible problems, then they are less likely to adopt such services. Again, the result could imply that if consumers distrust the agents or individuals who facilitate the FinTech service, then this could hinder the adoption of such a FinTech product. This result is in agreement with Rhu et al. (2018), who have observed that operational risk has a significant negative influence on the adoption of mobile FinTech services.

Legal risk negatively influences the adoption of FinTech products

We also investigated whether legal risk has a significant influence on FinTech adoption. The a-priori expectation was that it would have a negative influence on adoption. We expect that when consumers perceive that there is no strong and robust legal framework to regulate FinTech services, it will serve as a disincentive to adoption. The empirical findings confirmed this expectation, as legal risk was found to be negatively associated with FinTech adoption (β=-0.179, t = 3.296, p = 0.001). This result corroborates the findings of Rhu (2018), who observed that the lack of legal legislation and regulatory framework to properly protect consumers within the FinTech space is a strong disincentive to FinTech adoption.

Privacy Concerns negatively influence the adoption of FinTech products

The use of FinTech services mostly requires the user to provide private and sometimes sensitive information to the provider before the service can be activated and used. This raises privacy concerns and the fear that private and personal information may get into the hands of unauthorized users. In view of this, we hypothesized that privacy concerns associated with FinTech services negatively influence adoption behaviour. The result revealed that this hypothesis is supported by the empirical model, given the following parameters (β=-0.147, t = 3.874, p = 0.001). The result means that when consumers perceive that their personal and private information is not safe in the hands of FinTech firms and MNOs, they may hesitate to adopt the same.

Trust in FinTech services positively influence Adoption

We also tested the hypothesis that trust is a positive determinant of FinTech adoption. From the empirical model, it is observed that this hypothesis is supported (β=0.239, t=5.269, p=0.001). This result makes it clear that when consumers trust FinTech services and express confidence in their ability to deliver as promised, they will adopt or continue to use such services. This result is in agreement with a number of existing findings (Stewart and Jurgens, 2018; Rhu, 2018; Meyliana, et al. 2018). Also, the finding supports Meyliana, Fernando, and Surjandy (2018), who observed that trust is an important determinant of FinTech adoption. Fernando et al. (2019). This finding is also in agreement of Chuang, Liu and Kao (2016), who have empirically ascertained that trust is a major determinant of the adoption of innovative products and services in China. This result implies that when consumers are of the opinion that their transactions through FinTech platforms will not be tempered with and their information will be secured from unauthorized users, then they are likely to adopt or continue to use such FinTech platform.

Trust significantly mediates the relationship between risk-related factors and FinTech adoption

The empirical analysis also investigated the mediation role of trust in the relationship between risk-related factors on one hand and FinTech adoption on the other. The result of the analysis indicates that trust is a significant mediator in FinTech adoption. The result implies that even though risk factors negatively influence FinTech adoption, building trust reduces the negative influence of risk on FinTech adoption. This result is in agreement with Gu et al. (2016), Arpaci (2016), and Damghanian et al. (2016), who examined the relationship between risk, trust, and the adoption of new technologies and found that trust plays a very important role in the relationship between risk and the adoption

of new technologies. The result further suggests that whereas trust has a positive influence on FinTech adoption, such relationship is affected and weakened by the perceived risks associated with FinTech adoption.

RQ2: What is the Effect of FinTech Adoption on Savings, Borrowing, and Investment?

In research question two, the researcher investigated whether FinTech adoption and usage influence the savings, borrowing, and investment behaviour of consumers. Three research hypotheses were formulated and tested under this research question. The hypotheses examined the extent to which the use of FinTech platforms facilities saving, investment and borrowing intentions of users. First, we investigated whether FinTech adoption has a significant positive effect on consumer's savings behaviour. Second, we ascertained whether the investment behaviour of FinTech consumers is significantly influenced by FinTech adoption. Finally, we examine whether FinTech Adoption significantly influence consumer borrowing in SSA.

Based on the result of the data analysis, it was observed that the use of some FinTech models by consumers has an influence on investment, savings, and borrowing. Thus, we can postulate that use of some FinTech models contributes to changing the attitude of consumers towards investment, savings, and borrowing within the FinTech space. Our findings reveal that the use of mobile money transfer and payment FinTech does not significantly influence the savings and investment behaviour of consumers based on the empirical model but influence borrowing behaviour of consumers. Put differently, the study found that while there is proof that those who activate money transfer and payment platforms are likely to borrow on the platforms, there is no evidence to suggest

that these people are likely to save and invest on those same platforms. This result partially agrees with the findings of Demerguc-Kunt and Klapper (2013), who have observed that FinTech affects the savings and investment patterns of households.

Again, our findings seem to agree with an aspect of Paulsen and Yildirim's (2018) result, which indicates that money transfer and payment FinTech (mobile money) usage influence borrowing in China. The result partially agrees with the result of Evan and Pirchio (2015) who have posited that mobile money and other FinTech technologies can enhance borrowing and savings. Our findings, however, are at variance with the findings of Ky, Rugemintwari, and Sauviat (2017), who found that those who activate and use mobile money transfer technology are likely to save since it provides an easy avenue for households to build savings to meet unforeseen emergencies.

It is instructive to note that our results found a positive association between the use of money transfer and payment platforms and borrowing behaviour. The possible reason for the significant relationship between MTP FinTech usage and borrowing could be that MTP provides an avenue for users to seamlessly borrow compared to using the traditional financial system to effect borrowing, and as a result, those who are actively engaged in the use of MTP FinTech. This finding is in agreement with the findings of Buchak et al. (2018) in the US, who found that because FinTech lending is cheaper and more convenient compared to traditional lending, those who activate FinTech platforms are more likely to use such platforms to borrow, thus arguing that FinTech activation encourages borrowing, savings, and investment.

Again, the results indicate that those who actively use automated investment advisory services, popularly known as robo-advisors, are more likely to borrow, invest and save with FinTech services. This result is in agreement with the study by Becker (2017) in Germany, who observed that the activation of automated financial advisory services by individuals increases their likelihood of saving. The findings is also in tandem with that of Rosi and Utkuss (2019), who have found that in the US, the adoption of robo-advisors by households has resulted in an increase in the stock holdings of investors by almost 20%. The findings also agree with that of D'Acunto et al. (2019), which also focuses on the adoption of robo-advisors by household investors in India. The study's results indicate that the use of robo-advisors by investors helps improve their portfolio diversification. Again, the use of Robo-advisor services makes it easier for consumers to plan and manage their finances more efficiently, as extolled by Chishti and Barberis (2016). For example, budgeting apps and other money management tools have made it easier for people to keep track of their money and save more money than they would have without these tools.

We also investigated whether the use of peer-to-peer platforms affects the savings, investment, and borrowing behaviour of consumers. Our results suggest that there is a significant positive relationship between P2P usage on the one hand and the savings, investment, and borrowing behaviour of consumers on the other. This result suggests that consumers that use the P2P platform are more likely to save, invest, and borrow using a FinTech platform.

RQ3: What is the impact of FinTech on Traditional Banks?

Research question three of this study asked whether the growth of FinTech innovations in SSA is having a significant influence on bank performance. To answer this question, the following hypothesis was tested.

FinTech Growth has significant negative impact on the performance of banks.

From the empirical results presented under the results section, we find that our hypothesis that FinTech growth will have a significant negative influence on bank performance is not supported. Our results shows that there is no meaningful association between FinTech growth and bank performance. The result from the secondary and qualitative data also supports this result. The findings of our study somehow contradict the findings of Phan, Nayaran, Rahman, and Hutabarat (2019), who observed that there exists a significant and negative relationship between FinTech growth and the performance of traditional banks. The findings here are also at variance with the results of Vergas (2008). The lack of a significant adverse relationship between FinTech growth and bank performance among SSA banks may be explained by two key factors. First, FinTech growth and development in SSA can be described as slow, even though money payment and transfer FinTech continue to grow. Many businesses and households continue to rely on the traditional banking system for much of their transactions. This could explain why FinTech has not had a significant impact on the performance of traditional banks. Second, many traditional banks in SSA are collaborating strongly with FinTech startups and MNOs to design and deliver innovative financial services, and therefore, banks have not been significantly affected by the surge in the activities of FinTech startups and MNOs. The findings of this study provide a mixed outcome when compared with other studies.

The result, however, is in agreement with the findings of Navaretti, Calzolari, and Pozzolo (2017), who have observed that FinTech and banks are friends rather than foes, since they complement each other. The authors explain that while FinTech promotes competition within the financial sector and provides the services offered by traditional financial institutions more efficiently, they are not likely to replace banks or significantly affect the performance of banks. This argument is further supported by Purnomo, and Khalda (2019) and Temelkov (2018), who agree that due to possible collaboration between banks and the incumbent FinTech firms, the impact on bank performance may not be too significant. In addition, we investigated whether "*FinTech Growth has significant positive effect on Usage".* We hypothesized that the growth of FinTech should positively spur the usage of the same. Our empirical results support this hypothesis. Based on the path analysis, we find a strong and significant relationship between the growth of FinTech and usage or adoption of FinTech services. This result was expected given that the growth of FinTech is expected to be accompanied by various promotions and education on their usage and adoption.

We also investigated whether FinTech usage significantly mediates the relationship between FinTech growth and bank performance. A mediation analysis was conducted to determine the extent to which FinTech usage mediates the relationship between FinTech growth on the one hand and bank performance on the other. Our empirical results suggest that FinTech usage does not significantly mediate the relationship between the two variables. This result implies that FinTech usage and adoption do not play a significant role in influencing the relationship between FinTech growth and bank performance. In other words, FinTech growth does not impact bank performance through FinTech usage.

In addition to the test of the hypothesis, other descriptive analysis was conducted to determine the views of bank officials. The results of the descriptive statistics suggest that the activities of FinTech firms and MNOs are having some effect on traditional banks and are a threat to the future survival of these banks. However, we find that the banks are also collaborating with these FinTech firms for their mutual benefits.

RQ4: Has FinTech Growth and adoption influenced regulatory responses in SSA?

In research question 4, we explored the extent to which FinTech growth in SSA has elicited regulatory responses in SSA. Our findings indicate that the development of various FinTech platforms is eliciting strong regulatory responses in SSA. We find that since 2018, various initiatives have been implemented in the selected countries to support FinTech innovation while at the same time ensuring that consumers are protected against possible risk inherent in the operations of FinTech firms. For instance, we observe that the majority of the countries surveyed have instituted FinTech/innovation offices aimed at promoting the development and regulation of FinTech services in SSA. Again, plans are underway in these countries to develop bespoke regulations for specific FinTech services. Again, we see that the growth of FinTech is putting pressure on regulators to set up regulatory sandboxes that encourage innovation in the field.

The finding further revealed that whereas other FinTech models such as money payment and transfer FinTech, Robo-advisors, equity crowdfunding, and peer-to-peer FinTech, among others, have been accepted by the selected countries and are being regulated by countries with an effort being made to regulate them, crypto-currency is still struggling to gain acceptability among these countries. Again, we find that there are no bespoke

regulations for FinTech platforms. Instead, these countries rely on ad-hoc policies and legislation to regulate FinTech platforms.

Our result is in tandem with that of Johan and Pant (2019), who observed that the existing regulatory framework in Switzerland is not adequate to deal with the cryptocurrency risk in the country. Again, we corroborate the findings of Didenko (2018), who found that even though countries in SSA have made significant inroads into FinTech regulation, they still rely on ad-hoc measures to regulate FinTech services.

4.6 Summary of the Section

In this chapter, data has beeen comprehensively analyzed and discussed with the view of drawing conclusions and answering the various research questions. The chapter opens by giving a brief overview of the purpose of the study. It recounts the objectives and research questions as well as the approach to answering these questions. The chapter dealt with the issues of trustworthiness of the data as well as "reliability and validity" of the data. Information about the sources of the data and measurement of the data were explained to establish its trustworthiness. Also, since reliability and validity are crucial in determining the quality of the study's findings, both qualitative and quantitative techniques were employed to assess the "reliability and validity" of the constructs under this study. Knowing that data can be reliable but not necessarily valid, effort was also made to ensure that these two important attributes were ascertained. First, Cronbach's alpha and composite reliability tests were conducted to examine the internal consistency of the construct. The result clearly found that all the constructs had a Cronbach's alpha exceeding 0.7, indicating that the reliability and internal consistency of the constructs are acceptable. Again, the

validity of the data was investigated using various statistical techniques and a conclusion was drawn to the effect that discriminant, construct, and convergent validity of the constructs were achieved.

To effectively analyze the data, various steps, both qualitative and quantitative, were taken to ensure that the result is reliable and valid. The hypotheses under research questions one and three were tested with the aid of PLS-SEM techniques. The statistical test was conducted with the application of SmartPLS 3.5.1 statistical software. The PLS technique, based on structural equation modelling, was applied for two main reasons. First, it makes minimal assumptions regarding the characteristics of the quantitative data (Hair et al. 2011). Second, Hsu et al. (2006) posit that PLS-SEM is more stable than other statistical methods even when the data is highly skewed.

The test of normality using the Kolmogrov-Smirnov and Shapiro-Wilk test indicates that the data did not come from a normal distribution and, therefore, the use of PLS-SEM was appropriate for the analysis since it is a non-parametric estimate and does not require the data to come from a normal distribution. As far as the quantitative data was concerned, the assumptions of mutlicolinearity were tested using the "Variance Inflation Factor (VIF)" and the tolerance level estimates. The result shows that all the VIF values were less than 5 (VIF<5), suggesting that the assumption of no mutlicolinearity was met (Hair et al. 2014).

Also, since the current study relied significantly on survey data, the demographic characteristics of the participants were also presented under this chapter. Of the 818 students recruited, 63% were males, whereas the remaining 37% were females. With

regards to the bank sample, a total of 136 participants were recruited, and out of this number, 65% were males, while the remaining 35% were females.

After testing for validity and suitability of the model, estimation of the relationship between the study variables was conducted. The estimation resulted in, among other things, the path coefficient between different variables. The path coefficient determined the direction and size of the effect of the independent variables on the dependent variable. In addition to the estimation of the path coefficients, mediation analysis was also computed to determine the extent to which trust and awareness mediate the relationship between the independent variables on one hand and the dependent variable on the other. The significant level of the coefficient was examined using a significant level of 5%.

In research question one, we analysed the factors that affect the adoption of FinTech services in SSA. A total of seven hypotheses were tested under this hypothesis. The result revealed that ten out of the thirteen hypotheses were accepted, whereas the remaining three were rejected. The following variables were found to have a significant positive effect on FinTech adoption: Perceived Ease of Use ($\beta = 0.317, t = 7.659, p = 0.001$), Convenience ($\beta = 0.280, t = 7.432, p = 0.001$), Perceived Economic benefit ($\beta = 0.342, t = 7.852, p = 0.001$), and perceived usefulness ($\beta = 0.309, t = 6.466, p = 0.001$). The result further found a negative significant relationship between the following variables and FinTech adoption: legal risk ($\beta = -0.179, t = 3.296, p = 0.001$), Privacy concerns ($\beta = -0.147, t = 3.874, p = 0.001$), security risk ($\beta = -0.181, t = 4.084, p = 0.001$). Other variables such as financial risk and FinTech awareness/knowledge were found to have no significant relationship with FinTech adoption. The analysis further shows that trust

significantly mediates the relationship between risk and FinTech adoption. Also, knowledge/awareness was found to be an insignificant mediator between benefit factors and FinTech adoption.

In research question two, we sought to examine the influence of FinTech on the savings, borrowing, and investment behaviourof consumers. This question was answered using logistic regression. Logistic regression analysis is suitable when the dependent variable is determined to be categorical (yes/no, good/bad, etc.). Savings, borrowing, and investment usage under FinTech are coded in a binary (categorical format). Prior to the estimation of the logistic regression, a number of assumptions were tested. We tested for sample adequacy of the data and found that it meets the assumption of sample size. Multicolinearity was also tested, and the evidence indicates that the assumption of no multicolinearity was met. The regression analysis was done by estimating three models. In the first model (model 1), the dependent variable (savings) was regressed on five predictor variables and four control variables. In the second model (model 2), borrowing, the dependent variable, was regressed on five predictor variables and four control variables. In model 3, investment, which is the dependent variable, was a regression on five predictor variables and four control variables. Our results produced mixed outcomes. For instance, it was found that consumers who have activated money transfer and payment platforms are more likely to borrow. However, the activation of mobile payment and transfer platforms by consumers does not significantly influence their savings and investment behaviour. Furthermore, it was observed from the statistical result that consumers who adopt robo-advisors, P2P Platforms, and crowdfunding are more likely to invest, save and borrow using FinTech other platforms. In all the three models, pseudo R-square (Negelkerke R-

Square) was used to access the percentage of the variations in the dependent variable that are explained by the independent variables. We obtained 0.4, 0.56, and 0.46, respectively, for models 1, 2, and 3. For instance, we can say that 40% of the variations in savings behaviour of consumers can be explained by the FinTech adoption.

In research question three, we sought to investigate the impact of FinTech growth on the performance of banks using responses from bank officials in the selected countries. A total of 123 bank officials accepted to participate in the study. The composition of participants from the various countries is as follows: Ghana (48), Nigeria (33), Kneya (20), and South Africa (21). Using structural equation modelling, our path coefficient indicates that there is no significant relationship between FinTech growth and bank performance ($\beta = -0.021, t = 0.98, p = 0.346$). The result further indicates that usage of FinTech products does not significantly mediate the relationship between FinTech growth and bank performance.

Research question four of the study was answered using a document analysis technique. Thematic and content analysis were done to explore the regulatory framework of FinTech in SSA and the extent to which these frameworks strike a good balance between protecting the stability of the financial system and innovation promotion. The validity of the analysis was secured through the careful selection of the documents to be analyzed. Second, data collection was made easy due to the establishment of. The analysis of the data revealed that since 2018, significant strides have been made to regulate the FinTech industry, through the establishment of regulatory sandboxes (in the cases of Nigeria, Kenya, and South Africa), establishment of open banking, innovation and FinTech offices,

and legislation to protect consumers. However, we find that there are no bespoke regulations for the various FinTech products in SSA. The majority of the FinTech platforms, such as crowdfunding, peer-to-peer lending, and robo-advisors, are regulated using various existing legislation. We also notice that FinTech platforms, such as cryptocurrency, are not governed by bespoke regulations, nor are they governed by other laws. The lack of regulation for this particular platform is due to the inherent risk.

CHAPTER FIVE

IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSION

5.1 Introduction

There is no doubt that technology over the years has revolutionised the way we live our lives. Technological innovations have permeated all aspects of our lives and continue to shape our behaviour in diverse ways. Within the financial sector, the traditional approaches to lending, investment, payment, and savings are gradually being replaced by the application of FinTech models. Currently, there are diverse FinTech platforms offering almost all the financial services that are traditionally offered by banks. The digital revolution is not only changing the way financial products are designed but also how they are delivered. Today, many governments and central banks are placing significant emphasis on the digitalization of the financial system with the goal of advancing financial inclusion, improving user experience, and promoting economic growth. In SSA, financial technology is significantly changing the structure of the financial sector. It is estimated that over 260 FinTech companies offering a variety of FinTech products and services are operating within SSA (EY, 2019). The services offered by these FinTech firms are significantly transforming the lives of many Africans on a daily basis.

However, despite the increasing importance and acceptability of the FinTech phenomenon within the African continent, academic insight into the subject has been scarce and most publications on FinTech have been done through commercial reports (Zavolokina et al., 2016). Questions about the factors affecting consumer adoption of FinTech, the impact of FinTech services on the existing financial system and consumers,

and the nature of FinTech regulation within SSA are still begging for answers (Makina, 2019; Didenko, 2018). In a recent study published by Kavuri and Milne (2019) to explore gaps in the FinTech literature, the authors observed that there is a lack of research addressing the relationship between data security and the attitude of consumers towards FinTech services. They further highlighted the need to investigate customer attitude and behavioural factors that may have a meaningful effect on the acceptance of FinTech services in developing countries.

Based on these aforementioned gaps, the overarching aim of the current study was to examine consumer adoption of FinTech services in SSA and its implications for consumer financial behaviour, bank performance, and regulatory responses. Using UTAUT, TAM, Financial intermediation theory, and other related theories, the study investigated the determinants of FinTech adoption, the effect of FinTech adoption on consumer savings, investment, and borrowing behaviour, and the impact of FinTech on traditional financial institutions and the regulatory environment within SSA. Questionnaires and existing databases served as important sources of data for the study. The data was sourced from selected Sub-Saharan African countries. The study employed both quantitative and qualitative data analysis techniques to answer the stated research questions. To ensure that participants are protected, all acceptable ethical standards were strictly followed. The UNICAF Ethics Committee (UREC) and the research supervisor validated the research instrument and granted approval for it to be used for data collection. Also, the consent of each participant was sought before the questionnaires were administered. Furthermore, participation in the study was voluntary, and respondents were accorded the right to withdraw their participation as and when they deemed fit. Responses

from people who took part in the study were anonymous, which meant that the data could not be linked to specific people or groups.

The scope of the study was limited to four African countries, namely: Ghana, Nigeria, Kenya, and South Africa. These countries were selected based on their unique role in the development of the FinTech ecosystem in SSA. Whereas we admit that the use of questionnaires has its own challenges with respect to how respondents respond to the question, the researcher tried to eliminate all questionable responses to improve the validity of the findings. However, since the researcher did not have direct influence on how the questions were answered, he could not determine how well the respondents responded to the questionnaires. The current study considered direct and indirect effects using mediation analysis. However, the moderating role of some variables, such as age, gender, and income, on the dependent variable was not considered. These limitations, however, do not obliterate the quality and relevance of the results produced under this study.

In chapter four of this study, a comprehensive data analysis was conducted with the aim of understanding the views, attitudes, and behaviour of participants based on the examination of the relationship among study variables. In this chapter, the implications of the study's results, recommendations, and conclusion are presented. The current chapter is presented under four thematic sections. Section 5.1 presents the implications of the findings. A thorough discussion of the results and findings from the previous chapter is presented in this section. The key findings based on the research questions and hypotheses are also explained. Section 5.2 presents the recommendations for application. Under this section, recommendations are made for policymakers, FinTech firms,

governments/regulators, and banks based on the results of the study. In Section 5.3, recommendations for future research are outlined. Relying on the findings of the study and limitations identified in the research process, recommendations are proffered for the consumption of the academic and research community. These recommendations are intended to help future researchers improve the scope and quality of their research and to examine other areas that could add to knowledge on financial technology. The final section, section 5.4, presents the conclusion of the study. Under this section, the take-home message of the entire research work is catalogued.

5.2 Implications

This section presents the implications of the result of this study. The study sought to achieve four specific objectives. The first was to examine the risk and benefit factors affecting the adoption of FinTech in SSA. Specifically, this was achieved using the adoption of mobile payment and transfer FinTech. The second specific objective investigated the influence of FinTech on savings, investment, and borrowing behaviour of consumers. In doing so, the researcher sought to identify whether the adoption of specific FinTech service has the likelihood to alter the savings, investment and borrowing behaviour of consumers. The third objective sought to ascertain the impact of the growth of FinTech services on the performance of banks. Finally, the fourth objective explored how FinTech regime is shaping the regulatory framework of FinTech in SSA, and how regulation of the sector strikes a balance between the promotion of innovative financial products on one hand and the integrity and stability of the financial system on the other. For the purposes of clarity, the implications are discussed under these four thematic questions.

RQ1: What are the factors influencing FinTech adoption in SSA?

Discussion of FinTech and its influence on consumers, banks, and regulatory responses will not be complete without examining the factors that promote or inhibit adoption of FinTech services. Understanding the factors which inhibit or promote FinTech services provides the basis for understanding its impact on key stakeholders within the financial space. In view of this, the first objective of this study was to examine the drivers and inhibitors of FinTech adoption. A total of nine predictor variables and two mediation variables were used to estimate the model based on the UTAUAT and TAM theoretical frameworks.

Before focusing on the main research question, descriptive statistics were employed to understand the adoption rate of FinTech services. Five major FinTech products that are popular and widely used in SSA were examined. These include money transfer and payment, equity crowd funding, peer-to-peer lending, Robo-advisors (asset management) as well as InsurTech. Preliminary analysis of the response revealed that compared to money transfer and payment FinTech, which have a very high adoption and activation rate, all other FinTech services, which were the focus of this study, had low adoption rates. For instance, the result shows that less than 38% of the respondents have actually activated and are using Robo-Advisory and asset management services. The other services and their adoption rates are as follows: equity crowdfuding (35%), peer-to-peer lending (31%), and InsurTech (33%). The implication of this result is that despite the growth of FinTech services in the world and SSA, some FinTech services are yet to receive widespread adoption and acceptance among SSA residents. This result is not different from the result

of Jung et al. (2017), who observed that despite the benefits associated with the use of robo-advisors and asset management FinTech platforms, they are still under-subscribed.

With respect to crowdfunding, the results indicate that its adoption is also low compared to money transfer and payment FinTech. One possible reason for this phenomenon, which is corroborated by Mollic (2012), is the perceived risk associated with the various crowdfuning platforms. Whereas some of the crowdfunding platforms serve as avenues for investment and lending, many people within SSA may not be willing to activate and use these platforms because of the perceived risk associated with them. Again, the extant literature and other empirical studies have established that some of these platforms are not accepted due to a lack of clarity on how they are regulated. In SSA, the majority of the FinTech platforms, including Robo-Advisors, do not have bespoke regulation and are therefore regulated by other existing legislation.

FinTech services have experienced an increase in awareness and use since 2015 (EY 2019). FinTech services have been adopted by 64% of the global population, with China and India leading the way with an 87 percent acceptance rate (EY, 2019). Although the number of FinTech consumers is increasing, we are now witnessing selective adoption of FinTech services. To put things in perspective, despite the fact that there are several FinTech services available today, only a handful of them have proven to be successful. “Money transfer and payment services, for example, are driving the global growth of FinTech services, with 50% of customers adopting them” (EY FinTech adoption Index, 2016). It is, therefore, not surprising that some consumers will perceive such platforms as risky and avoid same. However, given the benefits to be derived by consumers, it is worth

encouraging its adoption and use. The preliminary results further found that other FinTech models such as InsurTech and peer-to-peer lending are still under-subscribed when compared with other jurisdictions.

A structural equation modelling technique was applied to determine the factors that affect the adoption of FinTech. The relationship between the variables was estimated using PLS-SEM analysis. Overall, nine independent variables, two mediator variables and one dependent variable formed part of the model. Four of the independent variables can be described as perceived benefit factors, whilst the remaining five can be described as risk-related factors. Prior to the actual estimation, key requirements for reliability and validity of the data were met. Our results indicate that nine of the variables are significant determinants of FinTech adoption as they have a direct positive effect on the dependent variable. We observe that the perceived usefulness of FinTech has a strong positive impact on FinTech adoption ($\beta = 0.309, t = 6.466, p = 0.001$). The implication of this result is that when consumers perceive FinTech services as useful to their cause and that they enhance their work efficiency, they are likely to adopt such services. It also indicates that when consumers are convinced that a particular FinTech service will enhance their productivity compared to existing services, they will be more willing to activate and use such a service. This result corroborates the TAM model espoused by Davies (1989), which argued that the perceived usefulness of a new technology encourages adoption. The results from our study also indicated that among the benefits that promote FinTech adoption, perceived usefulness plays a very crucial role. Our findings are also in line with those of other studies such as Rhu (2018) which found that people will be more willing to use FinTech services if they have a positive effect on their lives. Other studies (see Ng and Kwok, 2017; Barakat and

Hussainey, 2013; Hong and Zhu, 2006) are also in agreement with our findings. The result has implications for FinTech firms, banks, and MNOs. In designing FinTech products, usefulness to potential consumers should not be discounted, as it is a major promoter of adoption.

The result further revealed that among the factors that influence FinTech adoption positively, perceived economic benefit has the highest effect, measured by the size of the coefficient. Using the path coefficient, we observe that economic benefit has a value of 0.342, a t-value of 7.85, and a p-value of 0.001. This result clearly shows that consumers consider the economic gains from FinTech services when making choices relating to adoption. Given that economic benefit is a very important motivation for the adoption of a particular financial service, it is not surprising that economic benefit is the most important factor affecting the adoption of FinTech services. The implication of this result is that when a FinTech service is introduced and it offers lower transaction and capital costs compared to existing services, then consumers will be willing and ready to adopt such services. The current findings corroborate a number of studies such as Kuo and Teo (2015) and Mackenzie (2015), who have both suggested that economic benefit is a significant determinant of FinTech adoption among consumers. From this result, it can be said that FinTech companies wishing to gain widespread adoption of their products must take steps to design the products in such a way that they offer significant economic benefits, such as reduced transaction and capital costs.

Our findings also show that the ease of use of FinTech services is a significant determinant of FinTech adoption in SSA (β= 0.280, t = 7.432, p = 0.001). This result is not surprising, as consumers will prefer financial services that offer convenience of place and

time. Thus, FinTech services that have been designed to offer benefits that allow consumers to undertake financial transactions seamlessly at any time and location will see widespread adoption among consumers of such products. This finding also corroborates the findings of Kuo and Teo (2015) and Sharma and Gutiérrez (2010), who have identified convenience as an important determinant of FinTech services. The result indicates that in designing FinTech products, FinTech firms and MNOs must consider introducing innovative products that offer the best of convenience to consumers in order to attract a high adoption rate.

According to our empirical findings, perceived ease of use of FinTech services and products is a significant determinant of adoption (β=3.45, t = 8.673, p = 0.001). According to Davies (1985), perceived ease of use (EOU) is the extent to which consumers of a given technology believe that the application of such technology will not be difficult to learn and use. Put differently, consumers consider an innovative product or service to have the "ease of use" attribute if it can be activated and applied with little or no effort. Introducing an innovative product that can be understood and applied by consumers does not only attract the educated few, but also those who have had little or no formal education. This result implies that in determining whether to adopt or use a particular FinTech service, consumers highly consider how easy it is to use such products or services. This finding corroborates the TAM theory by Davies (1989) and other empirical studies such as Chau and Ngai (2010), Akturan and Tezcan (2012), Szopinski (2016), Bhattacherjee (2000), and Saade (2007).

The results further found that consumer knowledge and awareness is not a significant determinant of FinTech adoption. In the empirical analysis, as part of the a-

priori expectations, the researcher expected “knowledge and awareness” of FinTech services to have a significant influence on adoption intentions. The estimation of the empirical model, however, indicated that there is no significant relationship between knowledge/awareness of FinTech products and their adoption. The implication of this result is that having superior knowledge about FinTech services does not necessarily indicate a willingness to adopt such a product. Consumers may be looking for other factors they deem critical to their adoption rather than mere knowledge or awareness of the product or service. This result, however, is at variance with a number of empirical studies that have observed that knowledge/awareness about FinTech services is a major determinant of adoption intentions (see Jin, Khin, and Seong, 2018).

In addition to the benefit factors that were expected to positively influence the adoption of FinTech services, five risk-related factors were included in the empirical model to test their influence on FinTech adoption. These are financial risk, security risk, legal risk, operational risk, and privacy concerns. From the estimation of the empirical model, all the risk types, with the exception of financial risk, were found to be significant determinants of FinTech adoption. We observed that each had a significant negative influence on adoption. Put differently, they inhibit the adoption of FinTech services by consumers. For instance, the results suggest that potential losses that are likely to be incurred due to fraudulent activities of hackers and crackers could negatively affect the acceptance and use of FinTech services. The implication of this result is that when deciding to adopt FinTech services, consumers are mindful of the potential losses they could suffer as a result of the fraudulent activities of unscrupulous people. When they perceive that their transactions will not be secured, they will not adopt and use such FinTech products and

services. This result is in tandem with the a-priori expectation of this study and also agrees with the findings of existing empirical studies such as Stewart and Jurgens (2018), Rhu (2018), and Meyliana et al. (2018). This finding, however, contradicts the findings of other empirical studies that have found security risk as an insignificant determinant of FinTech adoption (see, Kim et al. 2016; Fernando, Surayanto et al. 2019). The result implies that in order to improve the adoption behaviourof consumers of FinTech services, it is important for FinTech firms and MNOs to introduce security risk-mitigating strategies in the design of their products and services to minimize resistance to such products. Again, it is important for FinTech firms to give firm assurance to consumers with regards to the effort being made to minimize security risk.

With regards to legal risk, we find that it has a negative influence on FinTech adoption. This result implies that when consumers do not perceive that the legal and regulatory regime is robust enough to protect them when they activate FinTech services, they will not be willing to adopt such services. This result is supported by existing studies such as Rhu (2018), who has identified legal risk as a disincentive to FinTech adoption. This result makes it clear the regulatory and legislative regime within the FinTech ecosystem needs to be improved as it contributes significantly to FinTech adoption. As a result, central governments should make an effort to have a strong regulatory regime for FinTech products and services so as to encourage high adoption rates.

We further found from the empirical analysis that privacy concerns have a significant negative influence on FinTech adoption (β=-0.147, t=3.874, p=0.001). Privacy concerns means that users of mobile FinTech are worried that their personal data and information will be disclosed to unauthorized parties without their consent (Stewart and

Jurgens, 2018).The current result, which finds a significant negative relationship privacy concerns and FinTech adoption, implies that when consumers perceive that their private and sensitive information could get into the wrong hands and be used for other purposes, they will hesitate to adopt FinTech services. The result implies that FinTech firms should protect consumer information and privacy and give the needed assurance that their private and sensitive information user will not be divulged to unauthorized persons or institutions.

The result also shows that trust is a positive determinant of FinTech adoption, which corroborates a number of empirical studies in the arena of FinTech adoption. For instance, it agrees with the findings by Fernando et al. (2019), who have clearly demonstrated that trust is a major influencing factor as far as FinTech service adoption is concerned. This is further supported by Stewart and Jurjens (2018) and Didenko (2018). It is also consistent with the findings of Chuang, Liu, and Kao (2016), whose study in China revealed that trust is a major determinant of the adoption of innovative products and services. The findings also corroborate the findings of Meyliana, Fernando, and Surjandy (2018), who observed that trust and risk factors are important determinants of FinTech adoption. The findings, however, contradict other studies that have found no significant association between trust and FinTech adoption (see Kim et al. 2016; Fernando, Surayanto et al. 2019).

In addition to the direct relationships established between risk-related factors and FinTech adoption, we further investigated whether trust significantly mediates the relationship between these risk factors and the adoption of FinTech services. From the mediation analysis, we found that trust significantly mediates the relationship between risk-related factors (with the exception of security risk) and FinTech adoption. Put differently,

the analysis indicates that trust is a significant mediator between risk-related factors on the one hand and FinTech adoption on the other. The result implies that even though risk factors negatively influence FinTech adoption, building trust reduces the negative influence of risk on FinTech adoption. This result concurs with Gu et al. (2016), Arpaci (2016), and Damghanian et al. (2016), who have examined the relationship between risk, trust, and the adoption of new technologies and have found that trust plays a very important role in the relationship between risk and the adoption of new technologies.

In summary, the implication of the findings under research question one, which sought to investigate the main, is that whereas FinTech firms and the SSA government are working to improve the acceptance of digitization within the financial sector, risk factors such as legal risk, financial risk, security risk, and operational risk are major impediments to the adoption of FinTech services. On the other hand, the economic and technological benefits associated with FinTech innovation provide a major boost to the adoption of FinTech services. An interesting aspect of the findings is that the benefit factors dominately influence adoption compared to the risk factors. Put differently, the indicators of perceived benefits are more influential in FinTech adoption compared to the risk factors. This result suggests that consumers are generally willing to adopt FinTech services due to the benefits associated with them. However, some risk factors could serve as impediments to achieving complete adoption.

RQ2: Does FinTech adoption Affect Savings, Borrowing and Investment of Consumers?

In research question two, the researcher investigated whether FinTech adoption and usage affects savings, borrowing, and investment behaviourof consumers. To answer this question, logistic regression analysis was conducted to investigate the extent to which the activation and usage of various FinTech platforms affect the savings, investment, and borrowing behaviourof consumers. Three different models were formulated. The first model (Model 1) examined the effect of five FinTech models on the savings behaviourof consumers. The second also assessed the effects of five FinTech platforms on the borrowing behaviourof consumers, whereas the last model investigated the likelihood of consumers investing when they activate various FinTech platforms. All relevant statistical assumptions required for the successful estimation of logistic regression were met in all three models. Furthermore, the model fitness was tested using the Omnibus Test of Model Fitness and the Hosmer-Lemeshow test. Our result shows that those who activate and use money transfer and payment platforms, robo-advisor platforms, and crowdfunding platforms are more likely to borrow from FinTech related platforms or products. Again, we observe that those who activate robo-advisors, asset management services, crowdfunding, and peer-to-peer platforms are more likely to invest and save on these platforms.

This result partially agrees with the findings of Demerguc-Kunt and Klapper (2013), who have observed that FinTech affects the consumption, savings, and investment patterns of households. Again, our findings seem to agree with an aspect of Paulsen and Yildirim's (2018), which indicates that money transfer and payment FinTech (mobile

money) usage influence borrowing. It also partially concurs with the result of Evan and Pirchio (2015), who have posited that mobile money and other FinTech technologies can enhance borrowing and savings. Our findings, however, are at variance with the findings of Ky, Rugemintwari, and Sauviat (2017), who found that those who activate and use mobile money transfer technology are likely to save since it provides an easy avenue for households to build savings to meet unforeseen emergencies.

It is instructive to note that our results found a positive relationship between the use of money transfer and payment platforms and borrowing behaviour. The possible reason for the significant relationship between MTP FinTech usage and borrowing could be that MTP provides an avenue for users to seamlessly borrow compared to using the traditional financial system to effect borrowing, and as a result, those who are actively engaged in the use of MTP FinTech are more likely borrow on using these platforms. This finding is in agreement with the findings of Buchak et al. (2018) in the US, who found that because FinTech lending is cheaper and more convenient compared to traditional lending, those who activate FinTech platforms are more likely to use such platforms to borrow, thus arguing that FinTech activation encourages borrowing.

Again, the results indicate that those who actively use automated investment advisory services, popularly known as robo-advisors, are more likely to borrow and invest with FinTech services. This result is in agreement with the study by Becker (2017) in Germany, who observed that the activation of automated financial services by individuals increases their likelihood of saving. Again t, this finding is in agreement with the findings of Rosi and Utkuss (2019), who have found that in the US, the acceptance of robo-advisors by households has resulted in an increase in the stock holdings of investors by almost 20%.

According to Rosi and Utkuss (2019), the adoption of robo-advisors by households has resulted in the increase of the stock holdings of investors by almost 20%. The findings also agree with that of D'Acunto et al. (2019), which also focuses on the adoption of robo-advisors by household investors in India. The study's results indicate that the use of robo-advisors by investors helps to improve their portfolio diversification.

We also investigated whether the use of peer-to-peer platforms affects the savings, investment, and borrowing behaviour of consumers. Our results suggest that there is a significant positive relationship between P2P usage on the one hand and the savings, investment, and borrowing behaviour of consumers on the other. This result suggests that consumers who use the P2P platform are more likely to save, invest, and borrow using a FinTech platform. This result implies that the evolution of FinTech is not only promoting financial inclusion in SSA, but it is also influencing consumer attitudes toward savings, investment, and borrowing. It is therefore important for FinTech firms, MNOs, and banks in SSA to initiate policies aimed at improving the access and delivery of FinTech products across the sub-region.

RQ3: Does the growth and development of FinTech affect the performance of banks

There is no doubt that financial technology has witnessed significant growth over the past decade owing to advances in information technology, increased global transactions, and the quest for efficient financial services. Despite its popularity, the banking sector is yet to fully grow accustomed to the dynamics of FinTech and the disruptive force it could exert. Whereas FinTech innovation could help banks enhance their operational efficiency and deliver quality service to their customers, it could also grant

non-bank firms the needed technology to perform tasks that were previously seen as the sole preserve of banks.

Against this backdrop, research question three investigated the extent to which the performance of banks is affected by the advent of FinTech. There is no doubt that the extent to which FinTech has affected bank performance has become a contentious issue. Authors are divided regarding the extent to which FinTech activities could positively or negatively affect bank performance. The current study makes an attempt to contribute to this discourse by empirically examining the relationship between FinTech growth and development and the performance of banks. Using survey responses of bank managers across four sub-Saharan African countries, we employed PLS-SEM to model the relationship between FinTech and bank performance, with FinTech usage serving as a mediator variable. Furthermore, secondary data in the form of bank and FinTech data were analyzed to gain additional insight. Our results revealed that even though various FinTech platforms have developed and expanded rapidly, this has not had a significant influence on the performance of the banks. We further observed that even though there is a positive relationship between FinTech growth and usage, usage of FinTech does not significantly mediate the association that exist between FinTech and the performance of traditional banks.

The implication of this result is that even though SSA is witnessing the massive development of FinTech activities, these activities have not significantly impacted traditional banks. Two reasons could be proffered for this result. First, many banks have embraced FinTech activities and are liaising with FinTech firms and incumbents to offer

these services, so one can argue that banks are also benefiting from FinTech activities. Second, whereas we acknowledge that FinTech activities are growing in SSA, the growth is not that huge to significantly chip away at the market share of banks within the financial space.

This result is at variance with the findings by Vives (2017), who asserts that the growth of FinTech rather improves the performance of banks. He posits that when faced with competition, banks are able to rethink and alter their business models to make them more efficient and variable. Hornuf et al. (2020) have also found that banks are leveraging FinTech innovations to improve their performance by collaborating and integrating FinTech models and firms into their operations, and this has actually improved their performance instead of retarding it.

Other studies have also established that FinTech growth adversely affects traditional bank performance. FinTech, according to a number of studies, has a negative impact on the banking industry. These studies argue that traditional banks, because of their rigorous regulation, are often unable to meet the demand for loans. The increased use of online lending has a direct impact on bank lending (Boot et al., 2021).

According to Buchak et al. (2018), FinTech is responsible for 30% of non-bank institution growth in the US, and FinTech lenders have expanded in the residential mortgage market, eroding traditional banks' market share. The current study' finding is at variance with these studies because, for instance, the mortgage market within SSA is not as robust as it pertains in the US, and as a result, the impact of FinTech activities in on banks will not be same as those in SSA countries.

RQ4: What are the regulatory responses to FinTech Growth in SSA?

FinTech (financial technology) is rapidly transforming the manner through which financial services are delivered. Whereas the revolution of FinTech creates opportunities, it also poses some risks to consumers, investors, as well as the broader financial system. It is expected that financial regulation will evolve to deal with these issues. It is against this backdrop that the fourth research question was formulated. To answer the question on regulatory responses to FinTech growth, a documentary analysis was conducted. In addition, interview responses from bank officials were elicited. A total of 12 related documents were analyzed, interpreted, and presented. The documents were analyzed under five thematic areas. First, we examined the main regulations and legislation within the FinTech ecosystem. Second, we analyzed the various FinTech products and platforms in the selected countries and the nature of their regulations. Third, we examined the various policies aimed at protecting consumers and the stability of the financial system. Fourth, the application of technology to handle FinTech regulation (Regtech) in the selected countries was examined. Finally, the challenges associated with FinTech regulation within SSA were also examined. Our findings for document analysis from the four SSA countries indicate that the development of various FinTech platforms is eliciting strong regulatory responses in SSA. We find that since 2018, various initiatives have been implemented in the selected countries to support FinTech innovation while at the same time ensuring that consumers are protected against possible risk inherent in the operations of FinTech firms. For instance, we observe that the majority of the countries surveyed have instituted FinTech/innovation

offices aimed at promoting the development and regulation of FinTech services in SSA. Again, plans are underway in these countries to develop bespoke regulations for specific FinTech services. Again, we observe that FinTech growth is putting enormous pressure on regulators to develop regulatory sandboxes to promote FinTech innovation.

Our findings revealed, first and foremost, that growth of FinTech in SSA has elicited a variety of policy and regulatory responses. Regulators and national governments have created FinTech-specific licensing regimes, requiring FinTech companies to go through an approval process before being allowed to offer FinTech services. Others, on the other hand, have enacted FinTech-specific regulations, amended existing ones, or flatly disallowed particular FinTech activities. FinTech innovation offices have also been established by some regulators and authorities to explain how the existing regulatory framework relates to FinTech companies and to clarify their supervisory expectations. However, despite these policy responses, there are still regulatory bottlenecks impeding the smooth regulation of FinTech services. These include the lack of expertise to handle the regulation, the use of multiple existing legislations to regulate FinTech services, and the lack of bespoke regulatory frameworks to handle specific FinTech innovations.

The finding further revealed that whereas other FinTech models such as money payment and transfer FinTech, Robo-advisors, equity crowdfunding, and peer-to-peer FinTech, among others, have been accepted by the selected countries and are being regulated, crypto-currency is still struggling to gain acceptability among these countries. Again, we find that there are no bespoke regulations for the majority of FinTech platforms.

Instead, these countries rely on ad-hoc policies and legislation to regulate FinTech products and services.

Our result is in tandem with that of Johan and Pant (2019), who observed that the existing regulatory framework in Switzerland is not adequate to deal with the cryptocurrency risk in the country. Again, we corroborate the findings of Didenko (2018), who found that even though countries in SSA have made significant inroads into FinTech regulation, they still rely on ad-hoc measures to regulate FinTech services.

From the research objective four we find that to realize the potential benefits of FinTech, governments and policymakers in SSA will need to resolve a number of trade-offs. By 2035, more than half of individuals joining the global jobs market will be in sub-Saharan Africa. Technological advancements and infrastructure development can help the continent turn its demographic advantage into opportunities, growth, and higher living standards for all.

Furthermore, authorities in the region must deal with the never-ending competition between rapid innovation and snail-paced regulation. There is a trade-off between promoting or at least facilitating rapid innovation, which has considerable potential economic advantages, and identifying and managing the risks associated with it through regulation and oversight in order to maintain the financial system's stability and integrity. In Sub-Saharan Africa, the FinTech sector is fast evolving, making it a tough task for regulators to detect, quantify, and manage the associated risks. Regulators, on the other hand, should be flexible enough not to hinder innovation while also ensuring that their goal of maintaining macroeconomic and financial stability and financial integrity is not

jeopardized. This trade-off must be competently managed by designing a robust regulatory regime.

5.3 Recommendations For practice

This study was conducted within the FinTech arena to support the growth and development of the subject, which is still in its infancy, and to answer some important empirical questions that are still begging for answers. The use of primary and secondary data has produced empirical results in relation to FinTech adoption; the impact of FinTech on savings, investment, and borrowing; the impact of FinTech on bank performance; and issues related to the regulation of the FinTech sector. Our results yielded findings that show that whereas some benefit factors are important drivers of FinTech adoption, other risk-related factors impede or inhibit the adoption of FinTech services. The results further proved that, depending on the type of FinTech service adopted, it could influence the savings, investment, and borrowing behaviour of consumers. The study further yielded findings that show that though FinTech firms are now offering financial services that were hitherto reserved for traditional banks, this has not significantly impacted negatively on the performance of these banks. These findings, among others, provide the basis for making recommendations to key stakeholders within the FinTech ecosystem. The recommendations are presented as follows:

For FinTech Firms /MNOs

a) The study's findings indicate that with the exception of money transfer and payment FinTech which has high adoption and usage rate among the participants, other FinTech services such as crowdfunding, robo-advisors, crypto-currencies, and peer-to-peer platform are still struggling to gain

widespread acceptance among SSA consumers. While there may be various reasons accounting for this phenomenon, the current research amply demonstrates that risk is a major inhibitor to FinTech adoption. Given that these FinTech services are perceived as risky, it is important for FinTech firms and MNOs who are spearheading FinTech innovation to develop strategies that will minimize the perceived risk associated with FinTech products. For instance, they can make their services more secure by introducing various firewalls and authentication protocols that will minimize the risks associated with these technologies.

b) According to the findings, other FinTech services, such as crowdfunding, robo-advisors, crypto-currencies, and peer-to-peer platforms, are still struggling to gain widespread acceptance among SSA consumers, with the exception of money transfer and payment FinTech, which have a high adoption and usage rate among the participants. While there are a variety of reasons for this occurrence, the current research clearly shows that risk is a major barrier to FinTech adoption. Given the risk associated with these FinTech services, it is critical for FinTech firms/MNOs who are leading FinTech innovation to develop risk-reducing strategies to assure consumers that their services or products are safe.

c) We further found from the analysis of the data that security risk, legal risk, operational risk, and privacy concerns are the major inhibitors of FinTech adoption among the participants in SSA. Put differently, the reason some

individuals are hesitant about adopting these innovative financial services is the perceived inherent risks associated with FinTech adoption. To deal with these fears and inhibitors of adoption, it is recommended that the design of FinTeh services have in-built mechanisms aimed at ameliorating the risk associated with them. For instance, introducing strong security measures such as data encryption, firewall enhancement, and multiple layers of authentication will go a long way to minimize these risks and enhance the confidence of consumers towards the use of these products or services.

d) We further observed from the findings that trust is a major driver of FinTech adoption and, at the same time, it could significantly mediate the relationship between risk-related factors on one hand and FinTech adoption on the other. In view of the significant role played by trust in minimizing risk perception towards FinTech services, it is incumbent on FinTech firms to build and deploy trusted systems that will assuage the fears of FinTech users. By developing and deploying systems that protect consumers from the actions of unscrupulous individuals, consumers will eventually develop trust in these FinTech products, which will eventually lead to increased adoption. Also, given that perceived operational risk has a significant negative influence on adoption, it is important for FinTech firms and MNOs to structure their internal processes in such a way that there will be no loopholes for criminals to exploit. Again, agents of these FinTech

firms/MNOs firms should be trained to operate according to laid down security measures to minimize fraud and impersonation.

e) Furthermore, since legislations and regulatory frameworks are crucial for the efficient development of the FinTech ecosystem, it is important that FinTech firms collaborate with the central bank and other mandated agencies and regulators to develop appropriate legislations and bespoke regulations that will enhance not only their activities but also the adoption intention of consumers, as the lack of appropriate legislations and regulations is a major setback to FinTech adoption.

f) The result of this study has highlighted the factors that promote FinTech adoption and those that inhibit same. This finding is especially relevant for FinTech and MNO managers who are making decisions regarding the deployment of resources in order to keep and grow their current customer base. As a result, our research offers managers practical advice on how to improve FinTech acceptance and usage. For instance, the study demonstrates that benefit-related factors are important positive determinants of FinTech adoption and, therefore, effort must be made by managers to deploy resources aimed at making these products more beneficial to consumers while taking steps to minimize the perceived risk associated with them.

i. **For Traditional Banks**

a) Our results indicate that even though banks have been slow in implementing FinTech technologies to enhance their operations and that some FinTech firms have taken some aspects of their operations, the empirical result finds no significant impact of FinTech growth or development on the performance of banks. However, it is envisaged that as FinTech products and services gain more recognition and acceptance within the sub-region, their activities could have a significant negative impact on the performance of banks. It is therefore recommended that for banks to remain competitive and viable in the face of the threats posed by FinTech firms and MNOs, they should focus on collaborating with FinTech firms and other MNOs. This collaboration will go a long way to create a win-win situation for both FinTech firms and traditional banks. The collaboration will ensure that FinTech firm gain the necessary experience and leverage on existing bank customers, whiles the banks will also gain the needed technological expertise from the FinTech firms to improve their operations.

b) While collaboration with FinTech firms may help banks stay competitive in the ever-changing financial arena, it may not significantly minimize the threat posed by FinTech firms to their activities. In the long run, FinTech firms may dominate the market and capture a significant part of the market share. For instance, money transfer and payment FinTech by MNOs may take over the lending function of banks and minimize their profitability. Again, the growth of crypto-currencies may, in the long run, reduce the

financial intermediation role played by traditional banks. To overcome these possible challenges, banks should procure and set up innovative infrastructure that could rival that of FinTech firms. Again, they should be proactive in implementing new technologies as and when they are introduced in order to stay on top of the game.

ii. **For government and Regulators**

a) Our results indicate that even though over the past few years the governments of SSA countries have been working to introduce regulatory frameworks for regulating the ever-growing FinTech sector, more needs to be done to expedite the formulation of bespoke regulations that will deal with specific FinTech services. Countries such as Ghana and South Africa must also take steps to implement their regulatory sandboxes to promote FinTech growth while at the same time protecting prospective consumers from the possible risks.

b) As technology advances and is applied to new services, financial authorities may have to confront new challenges in the future. To minimize these challenges, it is recommended that authorities make continuous efforts to understand new FinTech business models and their underlying risks, as well as build or maintain the skills and capacity to effectively analyze potential financial threats and change their regulatory responses in a timely manner to deal with these threats. Again, authorities and regulators may be able to lead innovation in a desirable direction while minimizing potential risks if they have appropriate resources and credible information to rely on. Thus,

the needed resources should be made available to policy makers, innovation offices and central banks to properly regulate the FinTech environment to enhance its potential benefits to the consumer and the society as a whole. Given the significant integration of the global financial system due to technological advancement, cooperation and coordination at the local and international levels remain critical to enhance the global FinTech ecosystem.

c) The findings of the study highlighted that risk-related factors are major hindrances to the acceptance of FinTech services. Given that many of the governments in SSA are advocating for and working towards financial inclusion and a cash-lite society, the regulators must liaise with FinTech firms to develop products that are risk-proof to engender confidence in these products and to assure consumers that they will be compensated when they incur losses through no fault of theirs

d) The current study gives some insight into the effort being made to improve the regulatory regime for FinTech in the selected SSA countries. It also highlights the role of various regulatory bodies in improving the regulatory frameworks. However, what the study does not do is thoroughly investigate the effectiveness of these regulatory frameworks in achieving the objective of satisfying FinTech innovators and consumers. Future researchers may consider conducting a thorough investigation into the effectiveness of the current regulatory regime in SSA. FinTech firms and other participants

within the FinTech ecosystem may be interviewed to gain more insight into the effectiveness and impact of these regulatory and legislative implementations.

e) There is no doubt that the availability of digital infrastructure could improve the effectiveness of FinTech regulation. Thus, in an effort to improve the regulatory environment, more investment must be made by the government within SSA in digital infrastructure in order to enhance confidence in the FinTech environment.

f) In SSA, FinTech is emerging as a potential game-changer in terms of fostering inclusive economic development and growth. However, these new technology and business models introduce new risks that must be addressed through appropriate regulatory frameworks. Thus, to exploit the potential advantages of FinTech while at the same to mitigating the risks associated with it, policy measures are needed. First, governments in SSA must tackle the region's massive infrastructure gap, starting with power and network services. Second, even though effort is been made to address regulatory bottlenecks within the FinTech arena, the pace at which these regulation issues are being addressed is far slower than the pace of FinTech growth. It is, therefore, incumbent on governments in SSA to expedite actions to improve regulatory responses. For instance, Ghana, which is yet to introduce regulatory sandboxes to manage the ever-growing FinTech

innovation, must expedite action on its development to improve its FinTech ecosystem.

5.4 Recommendation for Future Research

There is no doubt that FinTech in SSA is still in its infancy stage. More work needs to be done, not only to highlight how it can be improved to enhance financial inclusion but also to enhance the knowledge of the FinTech ecosystem. Whereas significant effort is being made by the academic community to enhance research on FinTech, more needs to be done to understand the FinTech ecosystem regarding its adoption, regulation, challenges, and opportunities. The current study, after a thorough examination of the phenomenon and its impact on key actors, has identified a number of pressing issues that require the attention of future researchers. Thus, the following recommendations are made for future researchers as they attempt to make research contributions to the subject of FinTech, especially in SSA. These recommendations, when vigorously pursued by researchers, will help establish FinTech as an important academic discipline in SSA and elsewhere.

a) The current study looked at the direct relationship between risk-specific factors and benefit-specific factors with regards to the determinants of FinTech adoption. In addition, the mediating role of trust and awareness in adoption was also investigated. However, the study did not investigate the effect of moderating variables on adoption of FinTech. It is therefore recommended that future studies should consider using variables such as income, age, and gender as moderating variables to determine their effect on FinTech adoption.

b) Second, the current study focused mainly on the adoption intentions of money payment and transfer as the dependent variable since it is the most common FinTech product currently available. It is recommended that future researcher will consider the specific adoption of other FinTech services such as cryptocurrency, crowdfunding, and peer-to-peer lending to determine whether the same influencing factors can be identified.

c) Our findings clearly revealed that growth of FinTech innovation has no significant influence on the performance of banks. Whereas the robustness of this result has been verified, future researchers may use bank level data across all countries in SSA to determine whether there are variations in the findings.

d) We observed from our results that, compared to money transfer and payment FinTech, other FinTech services are not receiving the needed attention. Thorough research on why these services are still struggling to receive widespread recognition should attract the attention of future researchers. A thorough qualitative study may be conducted to gain an in-depth understanding of the main reasons behind their low adoption rate. This will go a long way to helping FinTech firms, MNOs, and regulators identify what ought to be done to improve the adoption rate of other FinTech products services.

e) Our study mainly focused on selected SSA countries. Other researchers are encouraged to compare the adoption and regulatory regimes of different sub-regions to gain broader insight. Comparing the performance of FinTech regulation in SSA, the MENA region, and the APAC region will help highlight the position of the sub-region in FinTech adoption and regulation and the areas that the sub-region needs to improve.

f) In future research, it may be useful to examine the impact of additional moderating factors on the latent variables, such as age, gender, experience, industry, income, and so on. This could be useful for obtaining results for a more specialized target audience, such as the healthcare industry, financial services, baby boomers, millennials, underdeveloped countries, and so on. These various groups may have slightly different reasons for adopting technology (Venkatesh et al., 2012). While millennials and novice users may be easily persuaded to use mobile applications by their peers, other generations, such as baby boomers, may not. Furthermore, while those in the healthcare and financial sectors may be more concerned about privacy and security, the typical citizen may be ready to overlook these issues.

g) The current study estimated the relationship between the study variables to examine the main determinants of FinTech adoption using constructs that were collected at one point in time. This makes the findings susceptible to common method variance, as posited by Straub et al. (2015). Future researchers may employ longitudinal data to investigate the phenomenon of

FinTech adoption. This may lead to richer results and findings compared to the use of survey data. Again, the use of qualitative and quantitative data to examine FinTech adoption by future researchers will offer methodological triangulation, which will help them extract other variables that could influence FinTech adoption in SSA and elsewhere.

h) FinTech activities cover various models and platforms such as equity crowdfunding, cryptocurrency, money transfer and payment, peer-to-peer lending, etc. The current study sought to lump all of them together to determine their impact on non-financial performance measures. It is recommended that future researchers consider examining the impact of each of these FinTech models on the performance of banks. Additionally, this will help banks identify the areas they should allocate resources to focus on since not all the FinTech models will have a significant influence on their performance. Furthermore, due to the limited access to bank employees and their busy schedules, only 132 employees actually agreed to participate in the study. Future researchers may wish to expand the sample size of the bank respondents to enhance the generalization of findings.

i) Finally, the current study mainly focused on consumers of FinTech (students), bank employees, and regulators. One important group of participants within the FinTech ecosystem that is conspicuously missing in this study is the FinTech firms and MNOs. Future researchers are encouraged to investigate their perception regarding FinTech adoption and

the current regulatory regime currently pertaining in SSA and the world at large. Additionally, their perspectives and perceptions of collaboration and competition with traditional banks should be investigated in order to expand knowledge on FinTech implementations.

5.5 Conclusion

It is an undeniable fact that the financial services industry is changing in response to the rapid technological advancement. The use of technology to design and deliver financial services for consumers has taken a significant turn in recent years. Technology in finance is not only facilitating effective and efficient delivery of financial services but also improving financial inclusion in SSA. Against this backdrop, the aim of this research was to analyze the FinTech ecosystem in SSA by examining adoption intentions, impact on consumers, traditional banking systems, and regulatory responses. Based on the general objective of the study, four specific research questions were formulated.

Q1: What are the drivers and inhibitors of FinTech Adoption in SSA?

Q2: Does FinTech adoption affect the savings, borrowing and investment behaviour of consumers?

Q3: How has the FinTech affected the existing operations of traditional Banks?

Q4: How is FinTech regulated in SSA, and to what extent does FinTech regulation strike a good balance between promoting FinTech activities and safeguarding the integrity of the financial system

To achieve this broad objective, both quantitative and qualitative techniques were adopted. Whereas quantitative design was adopted to answer research questions one to three, qualitative content and thematic analysis was applied to answer research question

four. Relying on existing studies in the area of FinTech adoption and theories such as UTAUAT2, TAM, etc., possible risk and benefit factors were identified and analyzed to answer research question one. To ensure that the quality of the research outcome is not compromised, various statistical tests were conducted to test the validity and reliability of the data, and all these tests supported the validity and reliability of the data. PLS-SEM analysis was conducted, with the Despite the fact that FinTech is gaining popularity globally and in SSA, there have been few empirical research on how people perceive FinTech adoption. Before any meaningful progress can be made, a better knowledge of FinTech acceptance in the FinTech area is required. As a result, based on FinTech literature, this study used the positive and negative characteristics that drive FinTech adoption (Rhu, 2018). The outcomes of this study shed light on the benefits and risks that combine to decide whether or not FinTech services are adopted.

Research question two was answered by developing and testing three models using logistic regression. This was done to assess the influence of FinTech adoption and usage on the savings, investment, and borrowing behaviour of FinTech consumers. Put differently, the likelihood that participants will borrow, save, or invest when they activate and use various FinTech services was examined. All possible assumptions for the use of logistic regression were met in the estimation of all their models. Again, all three logistic regression models were statistically significant, i.e., “Model 1: Model 2: Model 3”. Models 1, 2 and 3 explained 34%, 31%, and 44% of the variance in the dependent variables, respectively, based on the Nagelkerke R2. The result of the analysis revealed that the activation and usage of money transfer and payment FinTech encourages borrowing, but no relationship was established between the activation of this FinTech and savings or

investment. The results further found that the use of robo-adivors and equity crowdfunding encourages savings and investment but does not encourage borrowing.

There is no doubt that financial technology has witnessed significant growth over the past decade owing to advances in information technology, increased global transactions, and the quest for efficient financial services. Despite its popularity, the banking sector is yet to fully grow accustomed to the dynamics of FinTech and the disruptive force it could exert. Whereas FinTech innovation could help banks enhance their operational efficiency and deliver quality service to their customers, it could also grant non-bank firms the needed technology to perform tasks that were previously seen as the sole preserve of banks. Against this backdrop, research question three investigates the extent to which the efficiency and performance of traditional banking firms are affected by the advent of FinTech, a question that requires empirical investigation to unravel. The third research question was also answered using PLS-SEM and panel regression techniques. The result from both the secondary and survey data found no significant association between FinTech growth and the performance of traditional bank. The implication of this result is that even though FinTech is chipping away at some of the customers within the traditional banking sector, it has not been able to significantly reduce their profitability and growth. Two possible reasons could be adduced for these findings. First, traditional banks are collaborating with FinTech firms to provide some services such as mobile money in SSA, and as a result, the impact has not been significantly felt by these banks. Second, though FinTech is making significant inroads into the financial systems of SSA, the growth has not been sufficiently massive to significantly affect the performance of traditional banks.

In the fourth objective, we sought to examine FinTech regulation within SSA and the extent to which it strikes a fair balance between promoting financial inclusion and innovation while at the same time safeguarding customers and the financial system. Data was obtained from existing databases, websites of selected countries, and published articles and documents. Our findings indicate that there is an attempt by SSA countries to regulate the FinTech industry to improve innovation and at the same time protect consumers. However, the analysis revealed that there are no specific laws, legislation, or regulations for FinTech models. Instead, existing laws are applied to handle specific FinTech activities. The findings further show that there are attempts by SSA countries to implement regulatory sandboxes, which are aimed at giving FinTech innovators the opportunity to implement their innovation in a testing mode. With regards to the regulation of FinTech, we found that the main focus of the regulation within the FinTech ecosystem in SSA is to ensure that affordable and convenient financial services are offered to consumers to promote the growth of the industry, while at the same time working to ensure that the stability of the financial system and its soundness is safeguarded to protect consumers within the financial market.

The current study and its findings add significantly to existing knowledge on FinTech and the extent to which it influences consumer, bank, and regulator behaviour. Based on the nature and findings of the study, it makes not only several theoretical contributions but also practical contributions. First, whereas there are various studies that have examined FinTech adoption and the main determinants, little evidence has been presented in the academic literature to support the role of perceived risk in determining FinTech adoption. The current study introduces several risk factors with the view of

determining their effect on adoption of FinTech products. In this study, financial, security, legal, and risk have been introduced alongside the usual TAM variables. Thus, the UTAUT has been enhanced with risk factors.

Second, the study makes a significant contribution in the field of consumer behaviour in the FinTech world by examining savings, investment and borrowing. The study, therefore, adds a fresh perspective on investment and savings and what promotes or inhibits same. Furthermore, the study has demonstrated that FinTech has the potential to influence household investment, borrowing, and savings. This means that FinTech could provide quality and significant information regarding consumer behaviour and make significant input in that direction. The study also offers the opportunity for regulators and the government to fashion out policies and regulations that will encourage and foster prudent savings, investment, and borrowing using FinTech platforms. Again, the current study is organized across four jurisdictions in SSA by comparing experiences across jurisdictions within SSA using consistent frameworks, thus shedding new light on the dynamic and evolving landscape of FinTech regulation. Also, the study's findings are in line with the agenda of SSA governments and regulators to foster FinTech growth and financial inclusion through technology.

Furthermore, this research makes a rare contribution to the existing body of knowledge by segregating the various risks into financial, legal, security, privacy, and operational. The author is yet to come across a study performed in the SSA environment using this approach. The findings, therefore, provides additional information for FinTech

firms to know the major risks militating against FinTech adoption in order to find specific solutions to them.

The current study also adds to the existing FinTech literature by giving a theoretical insight into the literature exploring the influence of FinTech companies' operations on traditional financial institutions, with the view to determining the future direction of the financial sector. The study also makes suggestions for further studies on FinTech's impact on social and economic well-being. The current study contributes to our insight of the effect of FinTech firms' development on the banking industry, which is becoming more important as opportunities and threats for the financial sector grow.

Despite the best effort by the researcher to undertake this study and to produce the best results, some limitations were encountered, and this is common for almost all academic research of this magnitude. Whereas there is a need to highlight these limitations to guide readers in the interpretation and generalization of the findings, these limitations do not in any way obliterate the quality and validity of the study's results and its findings. The limitations also offer opportunities for future researchers to add to what has been done in this study and to enlarge its scope. First, even though the users of FinTech are generally categorized as educated and young, this trend is changing. FinTech services are not mainly used by students but by the general population, including professional educators and general consumers. It must be stated that the current study relied on a student sample for gathering the survey data. It is, therefore, important for readers to interpret the findings with some caution. For instance, since the data was collected among student participants, it would be erroneous to generalize the findings to the overall FinTech user base. Thus,

future researchers may consider gathering data from all user groups as far as FinTech usage is concerned in order to generalize the findings to include different groups. Again, there are other situational factors that could help explain FinTech adoption in SSA. For instance, social and cultural factors could play a key role in explaining adoption intentions. However, the current study did not consider these variables in the analysis. Future researchers may include these cultural and social factors to determine their influence on FinTech adoption.

Furthermore, with the application of the UTAUAT framework, diverse factors could be considered when examining the variables that explain FinTech adoption. However, in our study, not all variables could be included. For instance, the trustworthiness of the service, user type, and experience were not factored into the analysis. Also, Venkatesh and Davis (2000) have opined that individuals adopt new technology because other people who are familiar with it have adopted and accepted such technologies. Thus social influence is recognized as one of the most critical element influencing the adoption of mobile financial services. However, as far as the current study is concerned, social issues and their impact on FinTech adoption were not explored. Future studies may include these important variables to determine their influence on FinTech adoption among SSA consumers.

Again, there is limited data on FinTech due to the fact that it is a field that is still in its infancy. As a result, bank level and regulator level data on FinTech that could provide further understanding of the subject was not obtained. In view of this, the researcher relied heavily on survey, interview, and existing documents to draw conclusions. Since survey data has its own flaws, it is envisaged that as more data on FinTech becomes available,

future researchers will consider using longitudinal and bank-level data to expand the scope and quality of the current study. Finally, the countries considered in this study are all developing economies. Since the impact of FinTech on developing economies may differ from that of advanced nations, future researchers may focus on developed countries to enhance the external validity of the findings.

References

Aaker, D. A., & *Keller*, K. L. (*1990*). Consumer evaluations of brand extensions. *Journal of Marketing*, 54(1), 27–41

Abdinoor A. and Mbamba, U.O.L. (2017). Factors influencing consumers' adoption of mobile financial services in Tanzania, *Cogent Business & Management*, 4(1), DOI: 10.1080/23311975.2017.1392273

Adan, M. O. (2016). An analysis of the impacts of Kenya Women Finance Trust (KWFT) on economic empowerment of women in Narok County.

Adeboye, O., Fagoyinbo, I. and Olatayo, T. (2014). Estimation of the Effect of Multicollinearity on the Standard Error for Regression Coefficients. *IOSR Journal of Mathematics*, 10. 16-20. 10.9790/5728-10411620.

Adom, D., Emad, H. and Adu—Agyem, J. (2018). Theoretical and Conceptual Framework: Mandatory Ingredients of a Quality Research. *International Journal of Scientific Research*, 7(1), 438-441.

Afi, (2016). Digital financial services: Basic terminology, *Guideline Note*, No. 19, Alliance for Financial Inclusion.

Afrikstart. (2016). Crowdfunding in Africa. Report by Afrikstart Crowdfunding Africa. http://afrikstart.com/report/wp content/uploads/2016/09/Afrikstart-Crowdfunding-In-Africa-Report.pdf

Agarwal, S. and Chua, Y.H. (2020). FinTech and household finance: a review of the empirical literature, *China Finance Review International*, Forthcoming.

Agarwal, S., Alok, S., Ghosh, P. and Gupta, S. (2020). FinTech and credit scoring for the millennials: evidence using mobile and social footprints, Manuscript.

Agrawal, A., Catalini, C. and Goldfarb, A. (2015). Crowdfunding: geography, social networks, and the timing of investment decisions, *Journal of Economics and Management Strategy*, 24 (2), 253-274.

Ahn, K., & June-Suh Cho. (2019). Major concerns of FinTech (financial technology) services in the korean market. *Journal of Business and Retail Management Research, 14*(1) doi:http://dx.doi.org/10.24052/JBRMR/V14IS01/ART-11

Ajakaiye, O. and O'Connell, S.A (2011). Central Banking In Sub-Saharan Africa: Introduction And Overview. *Journal of African Economies*. 20(2), 10-93

Ajzen, I. & Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behaviour, Prentice Hall Englewood Cliffs, NJ.

Ajzen, I., & Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behaviour. Englewood Cliffs, NJ: Prentice- Hall

Akturan, U., Tezcan, N. (2012). Mobile banking adoption of the youth market. Marketing Intelligence & Planning, 30(4), 444–459

Akturan, U., Tezcan, N. (2012). Mobile banking adoption of the youth market. *Marketing Intelligence & Planning*, 30(4), 444–459

Allchin, D. (2001). Error Types, *Perspectives on Science,* 9(1), 38-58.

Allen, F. & Santomero, A.M. (1997). The theory of financial intermediation. *Journal of Banking & Finance,* 21(11), 461-1485.

Alliance for Financial Inclusion. (2020). creating enabling FinTech ecosystems: The role of regulators. Kuala Lumpur, Malaysia: Authors. Retrieved from https://www.afi-

global.org/publications/3181/Creating-Enabling-FinTech-Ecosystems-The-Role-of-Regulators.

Almaqtari, F. et al. (2018). The determinants of profitability of Indian commercial banks: A panel data approach", *International Journal of Finance and Economics, 24(1),* 168-185

Alshehri, M., Drew, S., and Alhussain, T. (2012). The Effects of Website Quality on Adoption of E-Government Service: An Empirical Study Applying UTAUT Model Using SEM" (2012). *ACIS 2012 Proceedings*. 24. https://aisel.aisnet.org/acis2012/24

Alvesson, M. and Sköldberg, J., (1994). Vetenskapsfilosofi och kvalitativ metod. Studentlitteratur, Lund.

Anagnostopoulos, I. (2018). FinTech and regtech: impact on regulators and banks, *Journal of Economics and Business*, 100(7) 25-40.

Anagnostopoulos, I., (2018). FinTech and regtech: Impact on regulators and banks, *Journal of Economics and Business, Elsevier*, 100(6), 7-25

Ansari, S. and Krop, P. (2012). Incumbent Performance in the Face of a Radical Innovation: Towards a Framework for Incumbent Challenger Dynamics. Research Policy. 41. 10.2139/ssrn.2034266.

Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The evolution of FinTech: A new post-crisis paradigm. Georgetown Journal of International Law, 47(4), 1271-1319.

Arner, D. W., Barberis, J. N., and Buckley, R. P (2016). FinTech, RegTech and the Reconceptualization of Financial Regulation. *Northwestern Journal of International Law & Business*, Forthcoming, University of Hong Kong Faculty of Law Research Paper No. 2016/035, Available at SSRN: https://ssrn.com/abstract=2847806

Arpaci I. (2016). Understanding and predicting students' intention to use mobile cloud storage services. Comput Hum Behav. 2016 May;58:150–7. doi: 10.1016/j.chb.2015.12.067. [CrossRef] [Google Scholar]

Arvidsson, N. (2014). Consumer attitudes on mobile payment services – results from a proof of concept test. *International Journal of Bank Marketing*, 32(2) 150-170.

ASIC (2017). Regulatory Guide 257; ASIC: Brisbane, Australia, 2017
Available from: https://www.globallegalinsights.com/practice-areas/fintech-laws-and-regulations/nigeria

Barakat, A. and Hussainey, A. (2013). Bank governance, regulation, supervision, and risk reporting: Evidence from operational risk disclosures in European banks, *International Review of Financial Analysis*, 30(C), 254-273

Bartlett, R., Morse, A., Stanton, R. and Wallace, N. (2019). Consumer-lending discrimination in the FinTech era, NBER Working Paper 25943, National Bureau of Economic Research.

Batista, C., and Vicente, P. C. (2017). Improving access to savings through mobile money: Experimental evidence from smallholder farmers in Mozambique (No. novaf: wp1705). Universidade Nova de Lisboa, Faculdade de Economia, NOVAFRICA.

Beauchamp, T.L. and Childress, J.F. (2001) Principles of biomedical ethics. 5th Edition, Oxford University Press, Oxford, 59.

Beck, T., Haki P., Ravindra, R. and Burak U., (2018). Payment Instruments, Finance and Development, *Journal of Development Economics 133(1)*, 162–186

Beekhuyzen, J. & Hellens, L. (2006). An actor-network theory perspective of online banking in Australia. Association for Information Systems - 12th Americas Conference on Information Systems, AMCIS, 5, 374

Belanche, D., Casaló A.L. and Flavian, C. (2019). Artificial Intelligence in FinTech: understanding robo-advisors adoption among customers. *Industrial Management & Data Systems*. 119. 1411-1430. 10.1108/IMDS-08-2018-0368.

Belanche, D., Casaló, L.V. and Flavián, C. (2019), "Artificial Intelligence in FinTech: understanding robo-advisors adoption among customers", *Industrial Management & Data Systems*, Vol. 119 No. 7, pp. 1411-1430. https://doi.org/10.1108/IMDS-08-2018-0368

Bell, J., 2014. Doing Your Research Project: A guide for first-time researchers. McGraw-Hill Education (UK).

Belleflamme, P., Lambert, T. and Schwienbacher, A. (2014), "Crowdfunding: tapping the right crowd", Journal of Business Venturing, 29(5), 585-609.

Benston, G. J. & Clifford S. W, (1976). A Transactions Cost Approach to the Theory of Financial Intermediation, *Journal of Finance, American Finance Association*, 31(2), 215-231.

Bhardwaj, G. N., Sinha, G., & Pal, S. (2019). FinTech and the younger generation. *IUP Journal of Information Technology, 15*(1), 16-33.

Bhattacherjee, A. (2001). Understanding s continuance: an expectation-confirmation model.

BNY Mellon (2015). Innovation in payments. The future is FinTech. Available at http://www.bnymellon.com/global-assets/pdf/our-thinking/innovation-in-payments-the-future-is-FinTech.pdf

Boot, A., Hoffmann P., Laeven, C. and Ratnovski,L.(2021) FinTech: what's old, what's new? *Journal of Financial Stability*, 53, 1-13

Brandl, B. and Hornuf, L. (2017). Where Did FinTechs Come from, and Where Do They Go? The Transformation of the Financial Industry in Germany after Digitalization, Available at SSRN: https://ssrn.com/abstract=3036555 or http://dx.doi.org/10.2139/ssrn.3036555

Breidbach, C. & Keating, B. & Lim, C. (2020). FinTech: research directions to explore the digital transformation of financial service systems. *Journal of Service Theory and Practice*. 30. 79-102. 10.1108/JSTP-08-2018-0185.

Bright, V., Oteng, J. and Gyan, E. (2022). Law and practice: FinTech market in Ghana https://practiceguides.chambers.com/practice-guides/comparison/656/8501/13573 13575-13589-13593-13598-13601-13604-13614-13619-13623-13626-13629-13639

Brnovich, M. (2017). Regulatory Sandboxes Can Help States Advance FinTech; American Banker: New York, NY, USA, 2017. Available online: https://www.americanbanker.com/opinion/regulatory-sandboxes-can-help-states-advance-FinTech (accessed on 16 June 2020).21

Bromberg, L., Godwin, A., and Ramsay, I. (2017). FinTech sandboxes: Achieving a balance between regulation and innovation, *Journal of Banking and Finance Law and Practice*, 28(4), 314-336

Bryman, A & Bell, E. (2012). *Social Research Method*, OUP Oxford.

Bryman, A. (2008). *Social research methods*. 3rd Edition, Oxford University Press., New York.

Bryman, A. and Cramer, D. (2009). Quantitative data analysis with SPSS 14, 15 & 16: A guide for social scientists. Routledge/Taylor & Francis Group.

Buchak, Greg & Matvos, Gregor & Piskorski, Tomasz & Seru, Amit. (2018). FinTech, Regulatory Arbitrage, and the Rise of Shadow Banks. Journal of Financial Economics. 130. 10.1016/j.jfineco.2018.03.011

.

Buckley, R. and Webster, S. (2016). FinTech in Developing Countries: Charting New Customer Journeys. *Journal of Financial Transformation*, 44(1) 151-159.

Burtch, G., Ghose, A. and Wattal, S. (2015). The hidden cost of accommodating crowdfunder privacy preferences: a randomized field experiment, *Management Science*, 61(5), 949-962.

Byrne, M. (2009). *Structural Equation Modeling With AMOS: Basic Concepts, Applications, and Programming*, (2nd edn), Routledge: London, 2009.

Caracelli, V.J. *&* Greene*, J.C.* (1993). Educational Evaluation and Policy Analysis, 15(2), 195-207

CBinsights (2019). FinTech Trends to Watch; CBinsights: New York, NY, USA, 201

Chau, V. & Ngai, L. (2010). The youth market for internet banking services: Perceptions, attitude and behaviour. Journal of Services Marketing. 24. 42-60. 10.1108/08876041011017880.

Chau, V. & Ngai, L. (2010). The youth market for internet banking services: Perceptions, attitude and behaviour. Journal of Services Marketing. 24. 42-60.

Chellappa, R.K. and Pavlou, P.A. (2002). Perceived Information Security, Financial Liability and Consumer Trust in Electronic Commerce Transactions. *Logistics Information Management*, 15, 358-368.

Chen, M.A., Wu, Q.X., Yang, B.Z. (2019). How valuable is FinTech innovation? *Rev Financ Stud,* 32(5), 2062–2106

Chishti, S. and Barberis, J. (2016). *The FinTech Book*. Wiley, Chichester, West Sussex.

Christen, B. & Mas, I. (2009). It's Time to Address the Microsavings Challenge, Scalably, *Enterprise Development and Microfinance,* 20 (1), 274–85

Christensen, C. M., McDonald, R., Altman, E. J., & Palmer, J. E. (2018). Disruptive innovation: An intellectual history and directions for future research. *Journal of Management Studies*, *55*(7), 1043-107

Christensen, G., (1993). The Limits to Informal Intermediation. *World Dev*, 21, 721–731

Chua, C. J., Lim, C.S., and Aye, A.K. (2019). Factors Affecting the Consumer Acceptance towards FinTech Products and Services in Malaysia. International journal of Asian Social, Science, 9(1)

Chuang, L., Liu, C., Kao, H. (2016). The adoption of Finteh services: TAM perspective. *International journal of management and administrative sciences (IJMAS*), 3(7), 1-15

Chuttur, M.Y. (2009). Overview of the Technology Acceptance Model: Origins, Development and Future Directions, USA, Indians University. Sprouts: Working Papers on Information System, 9(1)

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioural sciences*, (3rd edn), Lawrence Erlbaum Associates Publishers.

Collis, J. and *Hussey,* R (2003). Business research. Palgrave Macmillan - Basingstoke [u.a.].Consumers International (2017), "Banking on the future: an exploration of FinTech and the consumer interest", Consumers International Monograph Coming Together for Change

Creswell, J. W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, Calif: Sage Publications

Creswell, J. W. (2014). *Research design: qualitative, quantitative, and mixed methods approaches.* 4th ed. Thousand Oaks, California: SAGE Publications

Creswell, J., & Plano Clark, V. (2007). *Designing and Conducting. Mixed Methods Research*. Thousand Oaks, CA: Sage.

Creswell, J.W. and Plano Clark, V.L., (2011). Choosing a mixed methods design. Designing and conducting mixed methods research, 2, 53-106.

Cronbach, L. J. (1951). Coefficient Alpha and the Internal Structure of Tests. Psychometrika, 16, 297–334

Crosby M, Nachiappan P. P., Verma S, Kalyanaraman V. (2016). Blockchain technology: Beyond bitcoin App. *ApplInnov Rev* 2(1), 6–19

Cumming, D. J and Schwienbacher, A. (2018). FinTech Venture Capital, Corporate Governance: *An International Review.* Available at SSRN: https://ssrn.com/abstract=2784797 or http://dx.doi.org/10.2139/ssrn.2784797

Cumming, D.J., Johan, S. & Pant, A. (2019). Regulation of the Crypto-Economy: Managing Risks, Challenges, and Regulatory Uncertainty. *Journal of Risk and Financial Management*, 12(3), 1-14.

CurrencyCloud (2016). Banks and the FinTech Challenge: How disruption has been a catalyst for collaboration and innovation, Currencycloud White paper.

D'Acunto, F., Rossi, A. and Weber, M. (2019). Crowdsourcing financial information to change spending behaviour, Manuscript.

Damghanian H, Zarei A, Kojuri M.A (2016). Impact of perceived security on trust, perceived risk, and acceptance of online banking in Iran. J Internet Commer. 15(3):214–38. doi: 10.1080/15332861.2016.1191052. [CrossRef] [Google Scholar]

Dapp, T.M. (2014), FinTech - The Digital Revolution in the Financial Sector: Algorithm-Based Banking with the Human Touch, Deutsche Bank Research, Frankfurt.

Das, S. (2019). The future of FinTech", Financial Management, Vol. 48 No. 4, pp. 981-1007.

Davies, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13, 319-339.

Demirguc-Kunt, A. & Klapper, L. (2013). Measuring Financial Inclusion: Explaining Variation in Use of Financial Services across and within Countries, *Brookings Papers on Economic Activity*, 44(1), 279-340

Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., Hess, J. 2(018). The Global Findex Database 2017: Measuring Financial Inclusion and the FinTech Revolution. 10.1596/978-1-4648-1259-0

Denzin*, N. K., &* Lincoln*, Y. S. (*2005*). The SAGE handbook of qualitative research (15th Edn). Thousand Oaks: Sage Publications. Chicago*

Denzin, N. K., & *Lincoln,* Y. S. *(2008). Strategies of Qualitative Inquiry* (3rd ed.). Thousand Oaks, CA: Sage

Desai, F. (2015). The Evolution of FinTech. http://www.forbes.com/sites/falgunidesai/2015/12/13/the-evolution-of-FinTech/#349c7f184ccb. Accessed 28 September 2020.

Didenko, A.(2018). Regulating FinTech: Lessons from Africa. *San Diego International Law Journal* 19(2) 311; UNSW Law Research Paper No. 18-18.

Drasch, B.J., Schweizer, A. and Urbach, N. (2018). Integrating the 'troublemakers': a taxonomy for cooperation between banks and FinTechs, Journal of Economics and Business, 100, 26-42.

Drost, E.A. (2011). Validity and Reliability in Social Science Research. *Education Research and Perspectives*, 38, 105- 123.

ECB (2012). ESCB/European banking supervision response to the European Commission's public consultation on a new digital finance strategy for Europe/FinTech action plan.

Economides, N. and Jeziorski, P. (2017). Mobile money in Tanzania, *Marketing Science*, 2399, 1-23.

Ehrentraud, J. Ocampo, D.G, Garzoni, L., and Piccolo, M. (2021). Policiy responses to FinTech: a cross country overview. FSI Insights on policy implementation No 23

Elsaid, H. (2021). A review of literature directions regarding the impact of FinTech firms on the banking industry. *Qualitative Research in Financial Markets*. Ahead-of-print. 10.1108/QRFM-10-2020-0197.

Ernst & Young (2016). FinTech adoption index, 1–44. Ernst & Young

Evans, D.S. & Pirchio, A. (2017). An Empirical Examination of Why Mobile Money Schemes Ignite in Some Developing Countriesbut Flounder in Most, Coase-Sandor Working Paper Series in Law and Economics No. 723, 201

EY, (2017). Global FinTech Adoption Index 2017, June.

EY. (2019). Global Findex adoption index. EY Group

Fama, E. (1980). Agency Problems and the Theory of the Firm. *Journal of Political Economy, 88*(2), 288-307.

Fama, E.F. (1980). Banking in the theory of Finance. *Journal of Monetary Economics*, 6(1), 39-57

Farrar, D. E. and Glauber, R. R. (1967). Multicollinearity in regression analysis: the problem revisited. *Rev. Econ. Statist,* 49, 92–107.

Fernando, E. Suryanto, S. & Meyliana, S. (2019). Analysis of the Influence of Consumer BehaviourUsing FinTech Services with SEM and TOPSIS, *International Conference on Information Management and Technology (ICIMTech)*, Jakarta/Bali, Indonesia, 2019, 93-97, doi: 10.1109/ICIMTech.2019.8843843.

Fernando, E., Condrobimo, A.R., Murad, D. F., Tirtamulia, L.M., Savina, G. & Listvo, P. (2017). User behaviouradopt utilizing FinTech services on on-line transportation in Indonesia (Scale validation and developed instrument)," in 2018 International Conference on Information Management and Technology (ICIMTech). Jakarta, Indonesia: IEEE, Sept. 3–5, 2018, 1–9.

Field, A. (*2009*). *Discovering Statistics Using SPSS*. (3rd edn), Sage Publications Ltd., London.

Financial Stability Board (2017). Financial Stability Implications from FinTech, Supervisory and Regulatory Issues that Me Authorities' Attention, June 27, 2017. URL: http://www.fsb.org/wp-content/uploads/R270617.pdf

Financial Stability Board, (2019). Evaluation of the effects of financial regulatory reforms on small and medium-sized enterprise (SME) financing: Consultation report", June.

Foerster, S. Linnainmaa, J. Melzer, B. and Previtero, A.(2017). Retail Financial Advice: Does One Size Fit All? *The Journal of Finance,* 72. 10.1111/jofi.12514.

Fornell C. and Larcker, D.F. (1981). *J. Mark. Res*, 1, 39-50

Forsythe, S., C. L. Shannon, D. and Gardner, L.C (2006). Development of a scale to measure the perceived benefits and risks of online shopping, *Journal of Interactive Marketing*. 20(2) 55-75.

Fox, A., Gardner, G., & Osborne, S. (2018). Nursing service innovation: A case study examining emergency nurse practitioner service sustainability. *Journal of Advanced Nursing*, *74*(2), 454-464

Frame, W. & Wall, L. & White, L. (2018). Technological Change and Financial Innovation in Banking: Some Implications for FinTech. Federal Reserve Bank of Atlanta, Working Papers. 10.29338/wp2018-11.

FSD Kenya (2016). *2015 annual report*. Nairobi, Kenya: FSD Kenya.

Fulton S, & Krainovich-Miller B (2010). Gathering and appraising the literature. In LoBiondo-Wood G,Haber J (Eds)Nursing research: methods and critical appraisal for evidence based practice. SeventhEdition. Mosby Elsevier,Missouri, 56 – 84

Fulton, S. & Krainovich-Miller, B. (2010). Gathering and Appraising the Literature. INLoBiondo-Wood, G. & Haber, J. (Eds). Nursing Research: Methods and Critical Appraisal for Evidence-Based Prcatice (7thEdition).St. Louis MO: Mosby Elsevier

Fuster, A., Plosser, M., Schnabl, P. and Vickery, J. (2019). The role of technology in mortgage lending, *Review of Financial Studies*, 32(5), 1854-1899.

Gai, K., Meikang, Q. & Sun, X. (2017). A survey on FinTech. *Journal of Network and Computer Applications*. 103. 10.1016/j.jnca.2017.10.011.

Gai, K., Qiu, M., & Sun, X. (2018). A Survey on FinTech, *Journal of Network and Computer Applications*, 103(1), 262-273

Gall, M. D., Gall,J. P., & Borg, W. R. (2003). Educational research: An introduction (7th ed.). Boston, MA: Pearson.

Gbolanhan, E., Ebimobowei, J., and Nova, E (2021). FinTech Laws and regulation in Nigeria, Global Legal Insight

Gbrich C. Qualitative Data Analysis: An Introduction (1st edn). London: Sage Publications, 2007. Google Scholar

Gimpel, H., Rau, D. & Röglinger, M. (2018). Understanding FinTech start-ups – a taxonomy of consumer-oriented service offerings. *Electron Markets* **28,** 245–264 (2018). https://doi.org/10.1007/s12525-017-0275-0

GLI (2021). FinTech Laws and Regulations in Nigeria www. https://www.globallegalinsights.com/practice-areas/FinTech-laws-and-regulations/nigeria

Global FinTech Report (2017). Redrawing the lines: FinTech's growing influence on Financial Services

Gomber P., Koch J.A., Siering M. (2017). Digital Finance and FinTech: current research and future research directions". *Journal of Business Economics*, 87(5), 537-580.

Goo, J.J and Heo, J.Y (2020). The Impact of the Regulatory Sandbox on the FinTech Industry, with a Discussion on the Relation between Regulatory Sandboxes and Open Innovation, J. *Open Innov. Technol. Mark. Complex*. 6, 43;

Grant C, Osanloo, A. (2014). Understanding, selection, and integrating a theoretical framework in dissertation research: Creating the blueprint for your "house." *Administrative Issues Journal*: *Connecting Education, Practice, and Research*, 4(2), 12-26

Gray, D. (2009). *Doing Research in the Real World. Edition*: (2nd Edn), London: Sage

GSMA. (2016). The state of mobile money in Western Africa. GSMA.

Gu, Z. Wei J., Xu, F.(2016). An empirical study on factors influencing consumers' initial trust in wearable commerce, *J Comput Inf Syst*. 56(1), 79–85. doi: 10.1080/08874417.2015.11645804. [CrossRef] [Google Scholar]

Gupta, A., & Arora, N.(2017). Consumer Adoption of M-Banking: A Behavioural Reasoning Theory, *Perspective.Int. J.Bank Mark,* 35 (1), 733–744

Haddad, C and Hornuf, L. (2016). The emergence of the global FinTech market: Economic and technological determinants: CESifo *Working Paper No. 6131; August, 2016*

Hair, J., Hult, T., Ringle, C., & Sarstedt, M. (*2014*). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Thousand Oaks, CA: Sage

Haqqi, F. and Suzianti, A. (2020). Exploring Risk and Benefit Factors Affecting User Adoption Intention of FinTech in Indonesia. 13-18. 10.1145/3400934.3400939.

Henseler,J. Hubona,G. and Ray, P.A(2016).Using PLS path modeling in new technology research: updated guidelines, *Industrial Management & Data Systems,* 16(1)

Hesse-Biber, S.(2016). Qualitative or Mixed Methods Research Inquiry Approaches: Some Loose Guidelines for Publishing in *Sex Roles*. *Sex Roles* 74, 6–9.

Hitchcock, G., & Hughes, D. (1995). Research and the teacher (2nd ed.). London: Routledge.

Hohenberger, Christoph & Lee, Chaiwoo & Coughlin, Joseph. (2019). Acceptance of robo-advisors: Effects of financial experience, affective reactions, and self-enhancement motives. FINANCIAL PLANNING REVIEW. 2. 10.1002/cfp2.1047.

Holland FinTech (2015). One inclusive ecosystem: Available from https://hollandFinTech.com/

Hosmer, D.W. and Lemeshow, S. (2000). *Applied logistic regression*. 2nd Edition, John Wiley & Sons, Inc., New York.

Hsu, M.H., Yen, C.H., Chiu, C.M., & Chang, C.-M. (2006). A longitudinal investigation of continued online shopping behaviour: An extension of the theory of planned behaviour. *International Journal of Human-Computer Studies, 64,* 889- 90

Hu, L.T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. *https://doi.org/10.1080/10705519909540118*

Hu, S. Ding, S. Li, S. Chen, L & Yang,S (2019). Adoption intention of FinTech services for bank users: An empirical examination with an ex-tended Technology Acceptance Model, *Symmetry*, 11(3), 1–16.

Hu, Zhongqing & Ding, Shuai & Li, Shizheng & Chen, Luting & Yang, Shanlin. (2019). Adoption Intention of FinTech Services for Bank Users: An Empirical Examination with an Extended Technology Acceptance Model. *Symmetry.* 11. 340. 10.3390/sym11030340.

Huang, C., and Hsieh, C. (2010). Sociology view on cloud computing value: Actor network theory perspective. Cloud Computing 2010: The First International Conference on Cloud Computing, GRIDs, and Virtualization. 145-149

Hulley, S. B., Cummings, S.R., Browner, W.S., Grady, D.G., and Newman, T.B (2007). Designing clinical research. (3rd Edn) Lippincott Williams and Wilkins; 2007

Hulme, D. & Moore, K. & Barrientos, A. (2009). Assessing the insurance role of micro savings.

Hur, Y., & Lim, S. H. (2017). An empirical study on the impact of the perceived securities and trust to diffusion of IoT-based smart banking services: Focusing on university students. *Insurance Finance Review*,28(1), 37–65

IAIS. (2017). FinTech Developments in the Insurance Industry.

Ilker, E. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics* 5(1), 1-12

Iman, N. Tan, A.W.K. (2020). The rise and rise of financial technology: The good, the bad, and the verdict, *Cogent Business & Management*, 7(1), DOI: 10.1080/23311975.2020.1725309

IMF (2018). The BALI FinTech Agenda: Blueprint for Successfully Harnessing FinTech's. Opportunities. Press Release No. 18/388

IMF (*2019b*World Economic Outlook: Growth Slowdown, Precarious Recovery," April *2019*," Washington, D.C.

Isaac, S. and Michael, W.B., (1995). Handbook in research and evaluation: A collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioural sciences. Edits publishers.

Jack, W., & Suri, T. (2014). Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution, *The American Economic Review*, 104(1), 183-223

Jiwasiddi, A. & Adhikara, C., Adam, M. Triana, I. (2019). Attitude toward using FinTech among Millennials. 10.4108/eai.26-1-2019.2283199.

Johnson, P. and Clark, M. (2006). Mapping the terrain: an overview of business and management research methodologies', in P. Johnson and M. Clark. (eds) *Business and Management Research Methodologies.* London: Sage.

Johnson, P. and *Clark*. M. (2010). Research Methods for Managers. SAGE Publications, Washington DC

Johnson*, R.B.,* Onwuegbuzie*, A.J. and Turner*, L.A. (*2007*). Toward a Definition of Mixed Methods Research. *Journal of Mixed Methods Journal of Mixed Methods Research*, 1, 112-133.

Jung, D., Dorner, V., Weinhardt, C. and Pusmaz, H. (2017). Designing a robo-advisor for risk-averse, low-budget consumers, *Electronic Markets*, 28(3), 367-380.

Kallet, R. H. (2004). How to Write the Methods Section of a Research Paper. *Respiratory Care,* 49, 1229-1232

Kalmykova, E., & Ryabova, A. (2015). FinTech Market Development Perspectives. *SHS Web of Conferences*, 28.

Kavuri, A. S. & Milne, A. K. L. (2019). FinTech and the Future of Financial Services: What Are the Research Gaps? CAMA Working Paper No. 18/2019, Available at SSRN: https://ssrn.com/abstract=3333515 or http://dx.doi.org/10.2139/ssrn.3333515

Kim, Y., Choi, J., Park, Y. Yeon, J. (2016). The adoption of mobile payment services for "FinTech". 11(1), 1058-1061.

Kim, Y., Choi, J., Park, Y. Yeon, J. (2016). The adoption of mobile payment services for "FinTech". 11(1), 1058-1061

Kimberlin, C. L., and Winterstein, A.G. (2008). Validity and reliability of measurement instruments used in research, *American Journal of Health System Pharmacists*, 65, 2276-2284. doi:10.2146/ajhp070364

Knewtson, H., & Rosenbaum, Z. A. (2020). Toward understanding FinTech and its industry. *Managerial Finance*. http://doi.org/10.1108/MF-01-2020-0024 Retrieved from: https://digitalcommons.mtu.edu/michigantech-p/1810

Knight, B. (2016). Innovation will stall without a Regulatory FinTech 'Sandbox' Senior research fellow, Mercatus Center at George Mason University.

Knight, B. (2017). Federalism and federalization on the FinTech frontier, *Vanderbilt Journal of Entertainment and Technology Law*, 20(1) 129-206.

KPMG (2020a), "2019 bi-annual analysis of global investment trends in the FinTech sector", The Pulse of FinTech H2 2019. available at: https://home.kpmg/xx/en/home/campaigns/2020/02/pulse-ofFinTech- h2-2019.html

Kumar, S. (2016), "Relaunching innovation: lessons from silicon valley", Banking Perspective, Vol. 4 No. 1, pp. 19-23.

Kuo C, D.L., and. Teo, E.G (2015). Emergence of FinTech and the LASIC principles, *Journal of Financial Perspectives,* 3(3), 24-36

Ky, S. Rugemintwari, C. & Sauviat, A. (2017). Does mobile money affect savings behaviour? Evidence from a developing country. *Journal of African Economies*, 1-36.

Lanford, P. (2006). E-commerce: a trust perspective. International Conference on Internet Computing 64–70

Lauren, P., & Lin, H. H. (2005). Toward an understanding of the behavioural intention to use mobile banking. *Computers in Human Behaviour*, 21(6), 873-891.

Lee, H., Harindranath, G., Oh, S., & Kim, D. (2015). Provision of mobile banking services from an actor network perspective: Implications for convergence and standardization. *Technological Forecasting and Social Change*, 90(1), 55-561.

Lee, I and Shin, Y. J. (2018). FinTech: Ecosystem, business models, investment decisions, and challenges. *Business Horizons*, 66(1), 35-46

Lee, M. C. (2009). Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit, Electronic Commerce Research and Applications. 8(3), 130-141

Leong, K. and Sung, A. (2018). FinTech (Financial Technology): What is It and How to Use Technologies to Create Business Value in FinTech Way? *International Journal of Innovation, Management and Technology*, 9(2), 74-78.

Li, F. (2020). Leading digital transformation: three emerging approaches for managing the transition. *International Journal of Operations and Production Management*, 40(6), 809-817.

Li, Y., Spigt, R., Swinkels, L. (2017). The impact of FinTech start-ups on incumbent retail banks' share price. Fin. Innov. https://doi.org/10.1186/s40854-017-0076-7.

Lim, S. H. Kim, D.J. Hur, Y. & Park, K (2019). An Empirical Study of the Impacts of Perceived Security and Knowledge on Continuous Intention to Use Mobile FinTech Payment Services, *International Journal of Human–Computer Interaction*, 35(10), 886-898Liu, I.F. Meng, C. Yeali, S., Wible, D. & Chin-Hwa, K. (2009). Extending the TAM model to explore the factors that affect Intention to Use an Online Learning Community. *Computers & Education, 54*(1), 600-610.

Liu, J., Xuerong L., and Shouyang, W. (2020). What Have We Learnt from 10 Years of FinTech Research? A Scientometric Analysis. *Technological Forecasting and Social Change* 155:120022

Luarn, P. and Lin, H.H. (2005). Toward an understanding of the behavioural intention to use mobile banking. *Computers in Human Behaviour*, 21(6), 873-891

Lyman, T., & Lauer, K. (2015). Digital financial inclusion: implications for customers, regulators, supervisors, and standard-setting bodies.

Mackenzie, A. (2015). The FinTech revolution, *London Business School Review.*, 26(3), 50-53.

Maduku, D.K., (2017). Customer acceptance of mobile banking. *Social Behaviourand Personality* 45(6), 893–900

Magnuson, W. (2018) Regulating FinTech, *Vanderbilt law review*1, 71(4), 167-1226

Makina, D. (2019). The potential of FINTEC in Enabling Financial inclusion (Chapter 14).https://doi.org/10.1016/B978-0-12-814164-9.00014-1

Manyika, J., Lund, S., Singer, M., White, O., & Berry, C. (2016). Digital Finance for All: Powering Inclusive Growth in Emerging Economies. McKinsey Global Institute. Sep

Martinez, W.L., Martinez, A. and Solka, J. (2011). E*xploratory Data Analysis with MATLAB,* 2rd ed., CRC Press, Taylor & Francis Group: New York, 2011.

Marty, A. (1961). Gurley and Shaw on Money in a Theory of Finance. *Journal of Political Economy, 69*(1), 56-62.

Mas, I., Mayer, C., (2011). Savings as Forward Payments: Innovations on Mobile Money Platforms. Forthcom. as Chapter 10 "Financial Incl. poverty alleviation Bank. unbanked." Essam Yassin Mohammed Zenebe Bashaw Uraguchi (eds). London Routledge. 1–14.

Maxwell, J. A. (2005). *Qualitative research design: An interactive approach* (2nd Ed.). Thousand Oaks, CA: SAGE Publications

Mayliana, M., Fernando, E. and Surjandy, S. (2019). The Influence of Perceived Risk and Trust in Adoption of FinTech Services in Indonesia, *Communication & Information Technology) Journal*, 13(1), 31–37

Mbithi, I., Weil, D.N., (2011). Mobile Banking: The Impact of M-PESA in Kenya, Working Paper Series, Working Paper 17129. NBER, Massachusetts.

McCoy, S. Galletta, D.F. & King, W.R. (2017). Applying TAM across cultures: the need for caution, *European Journal of Information Systems,* 16(1), 81-90

McDaniel, C., & *Gates*, R. H. (*2006*). *Marketing research essentials (15th edn)*. Hoboken, N.J: John Wiley. Chicago

McRobert, C.J, Hill, J.C., Smale T, Hay EM, van der Windt, D.A.(2018). A multi-modal recruitment strategy using social media and internet-mediated methods to recruit a multidisciplinary, international sample of clinicians to an online research study. PLoS One. 2018; 13(7):e0200184. doi: 10.1371/journal.pone.0200184. http://dx.plos.org/10.1371/journal.pone.0200184. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

Melewar, T., S. A., Tingchi, M. Liu, J.L., Brock, G., Cheng R. , and Tseng, T.H. (2013). Perceived benefits, perceived risk, and trust: Influences on consumers' group buying behaviour, *Asia Pacific Journal of Marketing and Logistics*. 25(2), 225-248

Meyliana, M., Fernando, E. & Surjandy, S. (2019). The Influence of Perceived Risk and Trust in Adoption of FinTech Services in Indonesia. *CommIT (Communication and Information Technology) Journal*. 13(31), 5708.

Meyliana, M., Fernando, E. & Surjandy, S. (2019). The Influence of Perceived Risk and Trust in Adoption of FinTech Services in Indonesia. *CommIT (Communication and Information Technology) Journal*. 13(31), 5708.

Miles, J. and Shevlin, M. (2014). Appling regression and correlation, a guide for students and researchers

Mollick, E. (2014). The dynamic crowdfunding: and exploratory study. *Journal of business venturing*, 29(1), 1-16.

Morse, J.M., 1991. Approaches to qualitative-quantitative methodological triangulation. Nursing research, 40(2), pp.120-123.

Muzellec, L., S. Ronteau and Lambkin, M. (2015). Two-sided Internet platforms: A Business Model Lifecycle Perspective, *Industrial Marketing Management*, 45(4),139–150.

Navaretti, G B, Calzolari, G. & Pozzolo, A. F. (2017). FinTech and Banks. Friends or Foes? *European Economy* 2017 (2).

Navaretti, G B, G Calzolari and A F Pozzolo (2017). FinTech and Banks. Friends or Foes? *European Economy* 2017(2).

Netemeyer, R. G., Bearden, W. O., & Sharma, S. (*2003*). *Scaling Procedures Issues and Applications.* Thousand Oaks, CA Sage Publications.

Ng, A.W. & Kwok, B.K.B (2017). Emergence of FinTech and Cyber security in a Global Financial Centre: Strategic Approach by a Regulator. Financ. Regul. Compliance, 25, 422–434

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

OECD (2018). *Financial Markets, Insurance and Private Pensions: Digitalization and Finance*

Oh, S., & Lee, H. (2005). How technology shapes the actor network of convergence services: A case of mobile banking. Twenty-Sixth International Conference on Information Systems.

Okazaki, S. and Mendez, F. (2013). Perceived Ubiquity in Mobile services. Journal of interactive marketing, 27(2), 98-111.

Oliver, R.L (1981). A Cognitive Model for the Antecedents and consequences of Satisfaction, *Journal of Marketing Research,* 17(1), 460-469.

Ozili, P. K. (2018), Impact of Digital Finance on Financial Inclusion and Stability, *Borsa istanbul Review*, forthcoming.

Pallant*, J. (*2011*) SPSS* survival manual: A step by step guide to data analysis using the *SPSS* program. 4th Edition, Allen & Unwin, Berkshire

Patton, M. Q. (2001). Qualitative research and evaluation and methods (3rd ed.). Beverly Hills, CA: Sage.

Paulet, E. and Mavoori, H. (2019). Conventional banks and FinTechs: how digitization has transformed both models, *Journal of Business Strategy*, Forthcoming.

Paulsen, F. & Yildirim, S. (2018). Expanding financial inclusion: Does mobile money affect saving and borrowing behaviourin China? Conference: 2018 IDAS International Conference. Transformation and Challenges in the Asia

Peduzzi*,* P.*,* Concato*,* J.*,* Kemper*,* E.*,* Holford*,* T. R., and Feinstein, A. R.(). A simulation study of the number of events per variable in logistic regression, Psy 525/625 Categorical Data Analysis, Spring

Phan, D. H., Narayan, P.K., Rahman, R. E. & Hutabarat, A.R. (2019). Do financial technology firms influence bank performance? *Pacific-Basin finance journal*, 10(1), 1-13,

Phan, D. H., Narayan, P.K., Rahman, R. E. & Hutabarat, A.R. (2019). Do financial technology firms influence bank performance? *Pacific-Basin finance journal*, 10(1), 1-13

Pope C, Ziebland S, Mays N.(2006). Analysing qualitative data. In: C Pope, N Mays (eds). Qualitative Research in Health Care (3rd edn). Oxford: Blackwell Publishing, 63– 81.

Purnomo, H. and Khalda, S. (2019). Influence of Financial Technology on National Financial Institutions, IOP Conf. Series: *Materials Science and Engineering*, 662 (2019) 022037, doi:10.1088/1757-899X/662/2/022037

Puschmann, T. (2017). FinTech. *Business & Information Systems Engineering, 59(1)*, 69–76. https://doi.org/10.1007/s12599-017-0464-6.

PwC, (2017). *Explore the data: Redrawing the lines: FinTech's growing influence on Financial Services.* Global FinTech Report 2017. [Accessed, 10 January, 2020] Available from Internet: https://www.pwc.com/gx/en/industries/financial-services/FinTech-survey/report/data-explorer.html

PwC, (2017). *Explore the data: Redrawing the lines: FinTech's growing influence on Financial Services.* Global FinTech Report 2017. [Accessed, 10 January, 2020] Available from Internet:https://www.pwc.com/gx/en/industries/financial-services/FinTech-survey/report/data-explorer.html

Revilla, M., and Ochoa, C. (2015). Quality of Different Scales in an Online Survey in Mexico and Colombia. *Journal of Politics in Latin America*, *7*(3), 157–177.

Rhu, H. S. (2018). Understanding Benefit and Risk Framework of FinTech Adoption: Comparison of Early Adopters and Late Adopters. Proceedings of the 51st Hawaii International Conference on System Sciences

Rocco, T, Bliss, L., Gallagher, S. & Perez-Prado, A. (2003). Taking the Next Step: Mixed Methods Taking the Next Step: Mixed Methods Research in Organizational Systems Research in Organizational Systems. *Information Technology, Learning, and Performance Journal*. 21(1)

Rogers, E.M. (2005). Diffusion of innovations (5th Edition). New York, NY: Macmillian Publishing Co.

Rose, J., Jones, M., & Truex, D. (2005). Socio-Theoretic Accounts of IS: The Problem of Agency. *Scandinavian Journal of Information Systems*: 17(1), 1-20

Rossi, A.G. and Utkus, S. (2019). Who benefits from robo-advising? Evidence from machine learning, Manuscript.

Ryan, C. (2019). Regulating FinTech in Canada and the United States: Comparison, Challenges and Opportunities, 12(19).

Ryu, H. S. (2018). What makes users willing or hesitant to use FinTech? the moderating effect of user type. *Industrial Management & Data Systems*, 8(3), 541–569

Saleh, A. and Bista, K. (2017). Examining factors impacting online survey response rates in educational research. Perceptions of Graduate students. *Journal of multidisciplinary evaluation*, 13(19), 63-74

Sangwan, V., Prakash, H.P. and Singh, S. (2019). Financial technology: a review of extant literature", Studies in Economics and Finance, 37(1), 71-88.

Sapovadia, V. (2018). Financial Inclusion, Digital Currency, and Mobile Technology, in Handbook of Blockchain, Digital Finance, and Inclusion, Volume 2, ed. by David Lee Kuo Chuen and Robert H. Deng, 361-385

Saunders, M., Lewis, P. and Thornhill, A. (*2012*) Research Methods for Business Students. Pearson Education Ltd., Harlow.

Saunders, M., Lewis, P. and Thornhill, A., (2016). Research Methods for Business Students (7th edn.). Harlow: Pearson Education.

Saunders, M., Lewis, P. and Thornhill, A., (2018). Research Methods for Business Students (8th edn.) Harlow: Pearson Education.

Schaner, S. (2017). The cost of convenience? Transaction costs, bargaining power, and savings account use in Kenya, *Journal of Human Resources*, 52(4), 919-945.

Schueffel, P. (2016). Taming the Beast: A Scientific Definition of FinTech. *Journal of Innovation Managemen*t, 4(1), 32-54.

Sharma, S., & Gutiérrez, J. A. (2010). An evaluation framework for viable business models for M-commerce in the information technology sector. *Electronic Markets, 20*(1), 33-52.

Shim, Y. & Shin, D.D.H (2016). Analyzing China's FinTech Industry from the Perspective of Actor–Network Theory, *Telecommunications Policy*, 40(2**)**

Siddik, M. (2014). Financial inclusion through mobile banking: A case of Bangladesh, *Journal of Applied Finance and Banking*. 4(1), 109-136.

Siek, M., & Sutanto, A. (2019). Impact Analysis of FinTech on Banking Industry. 2019 International Conference on Information Management and Technology (ICIMTech), 1, 356-361.

Sinclair M. (2007) Editorial: A guide to understanding theoretical and conceptual frameworks. *Evidence Based Midwifery* 5(2), 39

Skan J, Dickerson J, Masood S (2015.) The Future of FinTech and Banking: Digitally disrupted or reimagined? Available at http://www.FinTechinnovationlablondon.co.uk/media/730274/Accenture-The-Future-of-FinTech-and-Banking-digitallydisrupted-or-reima-.pdf)

Soutter, L. Ferguson, K., & Neubert, M. (2019). Digital Payments: Impact Factors and Mass Adoption in Sub-Saharan Africa, *Technology Innovation Management Review*, 7(9), Available at SSRN: https://ssrn.com/abstract=3418628

Sperry, L. (2004). Assessment of Couples and Families: Contemporary and Cutting Edge Strategies (1st Ed.). New York, NY: Routledge

Stewart, H. and Jurjens, S. (2017). Data security and consumer trust in FinTech innovation in Germany. International Computer security, 1(26), pp. 109-128

Sun, H., & Zhang, P. (2006). The role of moderating factors in user technology acceptance. *Int. J. Hum. Comput. Stud.*, 64, 53-78.

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

Szopiński, T. (2016). Factors affecting the adoption of online banking in Poland, *Journal of Business Research*, 69(11), 4763-4768.

Tabachnick, B. G., & *Fidell*, L. S. (*2007*). *Using Multivariate Statistics*, 5th edn, New York: Allyn and Bacon

Tan, J. D., Purba, J. T., & Widjaya, A. E. (2019, January). Financial Technology as an Innovation Strategy for Digital Payment Services in the Millenial Generation. In 1st Aceh Global Conference (AGC 2018) (pp. 364-373). Atlantis Press

Teddlie, C. and Tashakkori, A., (2009). Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioural sciences. Sage.

Teixeira, T.S. and Piechota, G. (2019). Unlocking the Customer Value Chain: How Decoupling Drives Consumer Disruption, Currency.

Temelkov, Z. (2018). FinTech firms; Opportunities or threats to Banks? International Journal of Information, Business and Management, 10(1), 2018.

Tharkor, A. (2020). FinTech and banking: what do we know? *Journal of Financial Intermediation*, 41(1), 1-13.

The British Psychological Society. (2010). Code of Human Research Ethics. Retrieved from Wiley Online Library Google Scholar

Topolovec-Vranic J, Natarajan K. The use of social media in recruitment for medical research studies: a scoping review. J Med Internet Res. 2016 Nov 7; 18(11):e286. doi: 10.2196/jmir.5698. https://www.jmir.org/2016/11/e286/ [PMC free article] [PubMed] [CrossRef] [Google Scholar

Treece, E.W. and Treece Jr, J.W.(2019). Elements of research in nursing. Nursing, 7(6), 12-13.

Trochim, W. M. K. (*2006*). Types of Reliability. Research Methods Knowledge Base. Web Center for Social Research Methods.

Trochim, W.M., (2000). Research methods knowledge base-survey research. *Am J Sports Med*, 30(6), 212

Van Belle, G., 2011. Statistical rules of thumb (Vol. 699). John Wiley & Sons.

Vanderstoep, V.C, & Johnston, D.D. (2009). *Research Methods for Everyday Life: Blending Qualitative and Quantitative Approaches*. Wiley & Sons, Inc., Jossey-Bass. San Francisco

VargaS, D. (2017). FinTech, the new era of financial services. Vezetéstudomány / *Budapest Management Review*. 48(1), 22-32.

Venkatesh, V. & Davis, F.D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies, Management Science,45 (1), 186-204.

Venkatesh, V., Davis, G. B., Davis, F. D., & Morris, M. G. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27(3), 425–478

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157–178

Villeroy de Galhau, F. (2016), "Constructing the possible trinity of innovation, stability and regulation for digital finance", Financial Stability Review, 20, 5-13.

Vives, X. (2017). The impact of FinTech on banking. *European Economy, Banks, Regulation, and the Real Sector*, 2(1), 97-106.

Vives, X. (2017). Impact of FinTech on Banking. European Economy 2017 .29. Princeton University Press

Walker, G. (2017). Financial technology law: a new beginning and a new future. *International Lawyer*. 50(1), 137-215.

Wang, Y.S., Wang, Y.M., Lin, H.H. & Tang, T.I. (2003). Determinants of user acceptance of internet banking: an empirical study", *International Journal of Service Industry Management*, 14(5), 501-519.

Wechler, M., Perlman, L., and Gurung, N. (2018). The state of regulatory sandboxes in Developing countries. Digital Financial Services Observatory, Columbia Institute for Teleinformation, Columbia University, New York

William-Grut (2018). Financial Services Technology, 2018https://www.raconteur.net/report/financial-services-technology-2018

World Bank (The), (2016). World Development Report 2016: Digital Dividends", Washington

World Bank, (2018). The Global Findex Database 2017, April.
www.bps.org.uk/sites/default/files/documents/code_of_human_research_ethics.pdf

Yang, D. & Li, M. (2018). Evolutionary Approaches and the Construction of Technology-Driven Regulations. *Emerg. Mark. Financ. Trade*, 54, 3256–3271.

Yang, H & Yoo, Y. (2004). It's all about attitude: Revisiting the Technology Acceptance Model. *Decision Support Systems*, 38(1), 19-31

Yuksel et al., (2018). Determinants of profitability in the banking sector: An analysis of post-Soviet countries", Economies, 6(41)

Zavolokina, L., M. D, and Schwabe, G. (2016). FinTech–What's in a Name? *in proceedings of International Conference of Information Systems, 2016.*

Ziegler, T., Shneor, R., Garvey, K., Wenzlaff, K., Yerolemou, N., Hao, R. and Zhang, B. (2018), Expanding Horizons: The 3rd European Alternative Finance Industry Report, Cambridge Centre for Alternative Finance, Cambridge.

Appendix 1: Data Collection Tools

UNICAF UNIVERSITY, MALAWI

QUESTIONNAIRE FOR UNIVERSITY STUDENTS

Dear Respondent,
You are invited to complete the following questionnaire which aims at examining the impact of Financial Technology (FinTech) on consumers.

The questionnaire should only take 20 to 25 minutes to complete. Your responses are anonymous and will not be identified with you in any way. By participating in this survey, you are indicating that you understand that your responses are anonymous and will not be identified with you in any way. You may skip any question that you find intrusive or offensive, but it will help me if you respond to as many questions as you feel comfortable with.

You have the right to withdraw at any stage (prior or post the completion) of the research without any consequences and without providing any explanation. In this case, the data collected will be deleted.

Please complete all questions and make sure you follow the instructions for each question.

Informed Consent

I have read the information about this study, or it has been read to me. I have had the opportunity to ask questions and discuss about it. I have received satisfactory answers to all my questions and I have received enough information about this study. I understand that I am free to withdraw from this study at any time without giving a reason for withdrawing and without negative consequences. I consent to the use of multimedia (e.g. audio recordings, video recordings) for the purposes of my participation to this study. I understand that my data will remain anonymous and confidential, unless stated otherwise.

I consent voluntarily to be a participant in this study. [ ]
I do not consent to be a participant of this study [ ]

Please proceed to the questions if you have consented to be a participant of this study

PART A: DEMOGRAPHICS
Please indicate by ticking [✓] or writing in the appropriate boxes/spaces

1. Gender of Respondents: **Choose one option.**
   Male [ ]
   Female [ ]

2. What is your age? Write the exact age in years……

1. Where is your home located? **Choose one option.**
   Ghana [ ]
   Nigeria [ ]
   Kenya [ ]
   South Africa [ ]

2. What is the Highest Level of Education you are currently pursuing? **Choose one option**.
   Diploma/Certificate [ ]
   First degree [ ]
   Second degree [ ]
   Masters [ ]
   Terminal [ ]

3. What is Your Monthly Income? **Choose one option**.
   $100-$500 [ ]
   $501-$1000 [ ]
   $1001-$2000 [ ]
   $2001-$3000 [ ]
   Above $3000 [ ]

4. What is your employment status? **Choose one option**.
   Employed [ ]
   Unemployed [ ]

PART B: FinTech Knowledge and Usage
This section is designed to elicit your knowledge and usage of some FinTech products. Please indicate by ticking [✓] the appropriate boxes.

5. I am familiar with the word "FinTech" or Financial Technology
   Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

6. I use mobile application that is related to Financial transactions:
   Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

7. I adopt FinTech technology as soon as interest is introduced
   Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

8. Where is your home located? **Choose one option.**
   Ghana [ ]
   Nigeria [ ]
   Kenya [ ]
   South Africa [ ]

9. What is the Highest Level of Education you are currently pursuing? **Choose one option**.
   Diploma/Certificate [ ]
   First degree [ ]
   Second degree [ ]
   Masters [ ]
   Terminal [ ]

10. What is Your Monthly Income? **Choose one option**.
    $100-$500 [ ]
    $501-$1000 [ ]
    $1001-$2000 [ ]
    $2001-$3000 [ ]
    Above $3000 [ ]

11. What is your employment status? **Choose one option**.
    Employed [ ]
    Unemployed [ ]

PART B: FinTech Knowledge and Usage

This section is designed to elicit your knowledge and usage of some FinTech products. Please indicate by ticking [✓] the appropriate boxes.

12. I am familiar with the word "FinTech" or Financial Technology
    Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

13. I use mobile application that is related to Financial transactions:
    Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

14. I adopt FinTech technology as soon as interest is introduced
    Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

15. I will describe myself as an ardent user of FinTech products (Mobile payments etc.)
    Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

PART B: FinTech Knowledge and Usage

This section is designed to elicit your knowledge and usage of some FinTech products. Please indicate by ticking [✓] the appropriate boxes.

16. I am familiar with the word "FinTech" or Financial Technology
Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

17. I use mobile application that is related to Financial transactions:
Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

18. I adopt FinTech technology as soon as interest is introduced
Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

19. I will describe myself as an ardent user of FinTech products (Mobile payments etc.)
Strongly Agree [ ]; Agree [ ]; Neutral [ ]; Disagree [ ]; strongly disagree [ ];

20. ***Please indicate your level of familiarity with the following FinTech products: Where: Very Low(VL)=1, Low (L)=2; Moderate(M)=3; High(H)=4 and Very High(VH)=5***

Code	Statement	VL	L	M	H	VH
AA1	Crowdfunding	1	2	3	4	5
AA2	Crypto-currencies	1	2	3	4	5
AA3	Robo-Advising	1	2	3	4	5
AA4	Peer-to-peer lending	1	2	3	4	5
AA5	Mobile Payments	1	2	3	4	5
AA6	Budgeting Apps	1	2	3	4	5
AA7	Stock trading apps	1	2	3	4	5
AA8	Insurance Apps	1	2	3	4	5

21. ***Please indicate your level of usage of the following FinTech products: Where: Very Low (VL)=1, Low (L)=2; Moderate(M)=3; High(H)=4 and Very High(VH)=5***

Code	Statement	VL	L	M	H	VH
US1	Crowdfunding	1	2	3	4	5
US2	Crypto-currencies	1	2	3	4	5
US3	Robo-Advising	1	2	3	4	5
US4	Peer-to-peer lending	1	2	3	4	5
US5	Mobile Payments	1	2	3	4	5
US6	Budgeting Apps	1	2	3	4	5
US7	Stock trading apps	1	2	3	4	5
US8	Insurance Apps	1	2	3	4	5

PART C: Fintech Adoption

22. Choose one option for each question presented in the table below. Circle the number that represents your opinion.

Please be guided by the following: SD (1) =Strongly disagree; D (2) =Disagree; N=Neutral (3); A=Agree (4); SA=Strongly agree (5)

Category	Code	Statement	SD	D	N	A	SA
Knowledge	KK1	I have enough knowledge and understanding to use mobile FinTech services	1	2	3	4	5
	KK2	I have sufficient knowledge to handle any problem that may arise during the use of mobile FinTech service	1	2	3	4	5
	KK3	I have sufficient knowledge to process mobile FinTech transactions	1	2	3	4	5
	KK4	I am well informed about how to deal with problems arising from mobile FinTech service	1	2	3	4	5
Ease of Use	EU1	I think the operation interface of Fintech is friendly understandable	1	2	3	4	5
	EU2	It is easy to have the equipment to use Fintech services	1	2	3	4	5
Perceived Benefit	PB1	The use of Mobile FinTech has many advantages for me	1	2	3	4	5
	PB2	I can easily and quickly use Mobile FinTech	1	2	3	4	5
	PB3	Using Mobile FinTech is useful for me	1	2	3	4	5
	PB4	Using Mobile FinTech yields a more superior outcome quality than traditional financial services	1	2	3	4	5
Economic Benefit	EB1	The use of Mobile FinTech is cheaper than using traditional financial services	1	2	3	4	5
	EB2	I can save money when I use Mobile FinTech	1	2	3	4	5
	EB3	I can use various financial services with a low cost when I use Mobile FinTech	1	2	3	4	5
Convenience	CV1	I can access financial services quickly when I use Mobiel FinTech	1	2	3	4	5
	CV2	I can access financial services anytime anywhere when I use Mobile FinTech	1	2	3	4	5
	CV3	I can use financial services easily when I use FinTech	1	2	3	4	5

Financial Risk	FR1	Financial losses are more likely when I use FinTech	1	2	3	4	5
	FR2	Financial fraud or payment frauds are likely when I use FinTech	1	2	3	4	5
	FR3	Financial losses due to the lack of interoperability is possible when I use Mobile FinTech	1	2	3	4	5
Security Risk	SR1	I worry about the abuse of my financial information when I use Mobile FinTech	1	2	3	4	5
	SR2	My financial information is not secure when I use FinTech	1	2	3	4	5
	SR3	I worry that someone can access my financial information when I use Mobile FinTech	1	2	3	4	5
Legal Risk	LR1	My use of Mobile FinTech is uncertain due to many regulations.	1	2	3	4	5
	LR2	It is not easy to use MobileFinTech due to the government regulation	1	2	3	4	5
	LR3	There is legal uncertainty for Mobile FinTech users	1	2	3	4	5
Operational Risk	OP1	I am (might) not (be) worried about potential losses due to internal processes out of my field of control	1	2	3	4	5
	OP2	I am (might) not (be) worried about losses due to technological vulnerabilities of FinTechs	1	2	3	4	5
	OP3	I am (might) not (be) worried about the compensation of potential losses or information leakages	1	2	3	4	5
Data and Privacy Concerns	**PR1**	If confident my personal data is safe while using fintech services	1	2	3	4	5
	PR2	Fintech firms and Mobile Network Operators protect my information from unauthorized person	1	2	3	4	5
	PR3	I know what it takes to protect my data from unauthorized users when using fintech services	1	2	3	4	5
Trust	TR1	I trust FinTech systems to be reliable	1	2	3	4	5
	TR2	Trust FinTech systems to be secure	1	2	3	4	5
	TR3	Believe FinTech systems are trustworthy.	1	2	3	4	5
	TR4	Trust FinTech systems	1	2	3	4	5

Savings	SV1	Mobile FinTech usage encourages savings	1	2	3	4	5
	SV2	It is easier to make savings using mobile FinTech platforms	1	2	3	4	5
	SV3	It is convenient to save using mobile FinTech platforms	1	2	3	4	5
	SV4	Savings behaviour has improved with the use of mobile FinTech platforms	1	2	3	4	5
	SV5	Adopting mobile money may serve as an alternative saving Platform	1	2	3	4	5
Borrowing	BO1	I can borrow using Mobile FinTech services (ie mobile money)	1	2	3	4	5
	BO2	Interest on the borrowed amount is competitive	1	2	3	4	5
	BO3	I prefer borrowing from my mobile wallet	1	2	3	4	5
Investment	IV1	I invest using mobile money and other FinTech platforms	1	2	3	4	5
	IV2	It is easy and convenient to invest using FinTech platforms	1	2	3	4	5
	IV3	Investing with FinTech platforms provides competitive returns	1	2	3	4	5
	IV4	It is now extremely simple to invest online in mutual funds, stocks and other financial products using mobile payments and other FinTech service	1	2	3	4	5
Continual Use/Adoption	AA1	I would positively consider Mobile FinTech in my choice set.	1	2	3	4	5
	AA2	I intend to or continue to use Mobile FinTech to access financial services	1	2	3	4	5
	AA3	I would prefer Mobile FinTech.	1	2	3	4	5
	AA4	I would intend to and continue to use Mobile FinTech.	1	2	3	4	5
	AA5	I will use Mobile FinTech in the future	1	2	3	4	5

16. I have used FinTech platforms for savings over the past year YES [ ] NO [ ]

17. I have used fintech platforms for investment over the past year YES [ ] NO [ ]

18. I have used fintech platforms for borrowing in the last year YES [ ] NO [ ]

UNICAF UNIVERSITY, MALAWI

Questionnaire on FinTech Regulation and Impact
(For Commercial Bank Officials)

Dear Respondent,
You are invited to complete the following questionnaire which aims at examining the impact of Financial Technology (FinTech) on consumers, the banking sector and regulatory responses.

The questionnaire should only take 15 to 20 minutes to complete. Your responses are anonymous and will not be identified with you in any way. By participating in this survey, you are indicating that you understand that your responses are anonymous and will not be identified with you in any way. You may skip any question that you find intrusive or offensive, but it will help me if you respond to as many questions as you feel comfortable with.

You have the right to withdraw at any stage (prior or post the completion) of the research without any consequences and without providing any explanation. In this case, the data collected will be deleted.

Please complete all questions and make sure you follow the instructions for each question.

Informed Consent

I have read the information about this study, or it has been read to me. I have had the opportunity to ask questions and discuss about it. I have received satisfactory answers to all my questions and I have received enough information about this study. I understand that I am free to withdraw from this study at any time without giving a reason for withdrawing and without negative consequences. I consent to the use of multimedia (e.g. audio recordings, video recordings) for the purposes of my participation to this study. I understand that my data will remain anonymous and confidential, unless stated otherwise.

I consent voluntarily to be a participant in this study [ ]
I do not consent to be a participant of this study [ ]

PART A: DEMOGRAPHICS
Please indicate by ticking [✓] or writing in the appropriate boxes/spaces provided

1. Gender of Respondents:
   Male [ ]
   Female [ ]

PART A: DEMOGRAPHICS

Please indicate by ticking [✓] or writing in the appropriate boxes/spaces provided

1. Gender of Respondents:
   Male [ ]
   Female [ ]

2. What is your age? Write the exact age in years……

3. What is the Highest Level of Education you have completed:

   Bachelor's Degree [ ]
   Masters [ ]
   Other [ ]

4. Country of Resident: ……

5. Current Job Position ……

6. How long have you been working in your current position? .....

SECTION B: QUESTION ON FINTECH ADOPTION

Please Rank the following factors by indicating the extent to which you believe they positively affect FinTech Adoption: Where: very low (VL)=1, Low (L)=2; Moderate(M)=3; High(H)=4 and Very High(VH)=5

Code	Statement	VL	L	M	H	VH
FA1	Usefulness of FinTech products	1	2	3	4	5
FA2	Convenience of FinTech products	1	2	3	4	5
FA3	Ease of use of FinTech products	1	2	3	4	5
FA4	Economic Benefits of FinTech Services	1	2	3	4	5
FA5	Perceived security of Services	1	2	3	4	5
FA6	Perceived risk of FinTech Services	1	2	3	4	5

SECTION C: Growth of other FinTech products aside Mobile Money

Please indicate the level of usage/adoption of the following FinTech products/services: Where: very low (VL)=1, Low (L)=2; Moderate(M)=3; High(H)=4 and Very High(VH)=5

Code	FinTech Models		VL	L	M	H	VH
FM1	Crowd-funding		1	2	3	4	5
FM2	Crypto-currencies		1	2	3	4	5
FM3	Peer-to-peer lending		1	2	3	4	5
FM4	Mobile payment		1	2	3	4	5
FM5	Budgeting Apps		1	2	3	4	5
FM6	Stock Trading Apps		1	2	3	4	5
FM7	Insurance Apps		1	2	3	4	5

SECTION D: GROWTH OF FINTECH FIRMS/MOBILE NETWORK OPERATORS AND FINTECH ACTIVITIES

Please indicate the extent to which you agree or disagree with the following statements

Please be guided by the following: SD =strongly disagree (1); D =Disagree (2); N=Neutral (3); A=Agree (4); SA=strongly agree (5)

Code	Statement	SD	D	N	A	SA
GF1	There has been significant growth in the number of FinTech firms in the past years	1	2	3	4	5
GF2	Significant number of consumers have adopted FinTech product introduced by Mobile network operators (MNOs), Banks and other FinTech firms	1	2	3	4	5
GF3	FinTech Firms and their activities are expected to continue to grow into the foreseeable future	1	2	3	4	5
G4	Large number of mobile payment agents are sprung up in recent years	1	2	3	4	5
GF4	There has been significant investment in the growth of FinTech firms over the past years.	1	2	3	4	5

SECTION D: FINTECH AND THE BANKING SECTOR

Please indicate the extent to which you agree or disagree with the following statements

Please be guided by the following: SD =strongly disagree (1); D =Disagree (2); N=Neutral (3); A=Agree (4); SA=strongly agree (5)

Code	Statement	SD	D	N	A	SA
FB1	FinTech has reduced traditional bank customers	1	2	3	4	5
FB2	FinTech has affected the financial performance of Banks	1	2	3	4	5
FB3	The competition between banks and FinTech is good for customers	1	2	3	4	5
FB4	FinTech technologies have improved financial services	1	2	3	4	5
FB5	There is a strong collaboration between Banks and FinTech companies	1	2	3	4	5
FB6	FinTech has not significantly impacted the traditional banking system	1	2	3	4	5
FB7	FinTech for the traditional banks is an opportunity	1	2	3	4	5
FB8	FinTech is a threat to traditional banks	1	2	3	4	5
FB9	FinTech is a disrupter of traditional banks	1	2	3	4	5
FB10	FinTech and has reduced the market share of Banks	1	2	3	4	5
FB11	Number of accounts created has reduced over the past years	1	2	3	4	5
FB12	The market share of the bank has fallen due to the evolution of FinTech	1	2	3	4	5

SECTION E: FINTECH REGULATION

Please indicate the extent to which you agree or disagree with the following statements

Please be guided by the following: SD =strongly disagree (1); D =Disagree (2); N=Neutral (3); A=Agree (4); SA=strongly agree (5)

Code	Statement	SD	D	N	A	SA
RL1	The advent of FinTech influenced regulation within the Financial Sector	1	2	3	4	5
RL2	There specific regulatory framework for regulation FinTech services (ie Mobile payment platforms, crowdfunding, crypto-currency	1	2	3	4	5
RL4	There are challenges associated with the use of existing laws to regulate the FinTech sector	1	2	3	4	5
RL5	FinTech regulation is very challenges due to their business models	1	2	3	4	5
RL6	The challenges faced by regulators are technology-related	1	2	3	4	5
RL7	Regulatory sandboxing is being considered as one of the options for regulating the FinTech sector	1	2	3	4	5

RL8	The current regulatory framework is designed to protect FinTech consumers from fraud and other negative issues	1	2	3	4	5
RL9	The current FinTech regulatory framework promotes FinTech innovation	1	2	3	4	5
RL10	The current FinTech regulatory framework promotes financial inclusion and FinTech adoption	1	2	3	4	5
RL11	The current regulatory framework strikes a good balance between protecting consumers and at the same time encouraging FinTech innovation	1	2	3	4	5

UNICAF UNIVERSITY, MALAWI

Interview Guide

(For Selected Bank Officials)

Dear Respondent,
You are invited to complete the following interview which aims at examining the impact of Financial Technology (FinTech) on consumers, the banking sector and regulatory responses.

Your responses are anonymous and will not be identified with you in any way. By participating in this interview, you are indicating that you understand that your responses are anonymous and will not be identified with you in any way. You may skip any question that you find intrusive or offensive, but it will help me if you respond to as many questions as you feel comfortable with.

You have the right to withdraw at any stage (prior or post the completion) of the research without any consequences and without providing any explanation. In this case, the data collected will be deleted.

PART A: DEMOGRAPHICS
Please indicate by ticking [✓] the appropriate boxes

1. Gender of Respondents:
   Male [ ]
   Female [ ]
   |
2. What is your age? Write the exact age in years……

3. What is the Highest Level of Education you have completed:
   First Degree [ ]
   High school [ ]
   Bachelor's Degree [ ]
   Masters [ ]
   PhD [ ]
   Other (Please specify)……

4. Position ……

5. How long have you been working in your current position? .....

SECTION B: QUESTION ON FINTECH ADOPTION

1. What other factors do you believe positively affect the adoption of FinTech in your country?

2. What factors you believe adversely affect FinTech Adoption in your country

3. To what extent has financial consumers accepted the FinTech innovation in your contry

SECTION C: FINTECH AND THE BANKSING SECTOR

4. How will you describe the competition between the FinTech sector and the Banking sector within your jurisdiction?

5. Do you thing the advent of FinTech “technology has had a positive or negative impact on the Banking sector in your country”?

6. What is being done within your outfit to ensure that there is collaboration within the FinTech and banking sectors

SECTION D: FINTECH REGULATION

7. To what extent does the current regulation of Fintech ensure Consumer protection, Data protection, security and privacy of consumer information?

8. How does the current regulatory framework strike a good balance between promoting FinTech innovation and at the same time protecting consumers and the stability of the financial system?