

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,  
KUMASI, GHANA

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Assessing the Risks and Benefits Associated with Mobile Banking Technology in  
Ghana. A Case Study of GCB Bank in the Bolgatanga Municipality of the Upper East

Region

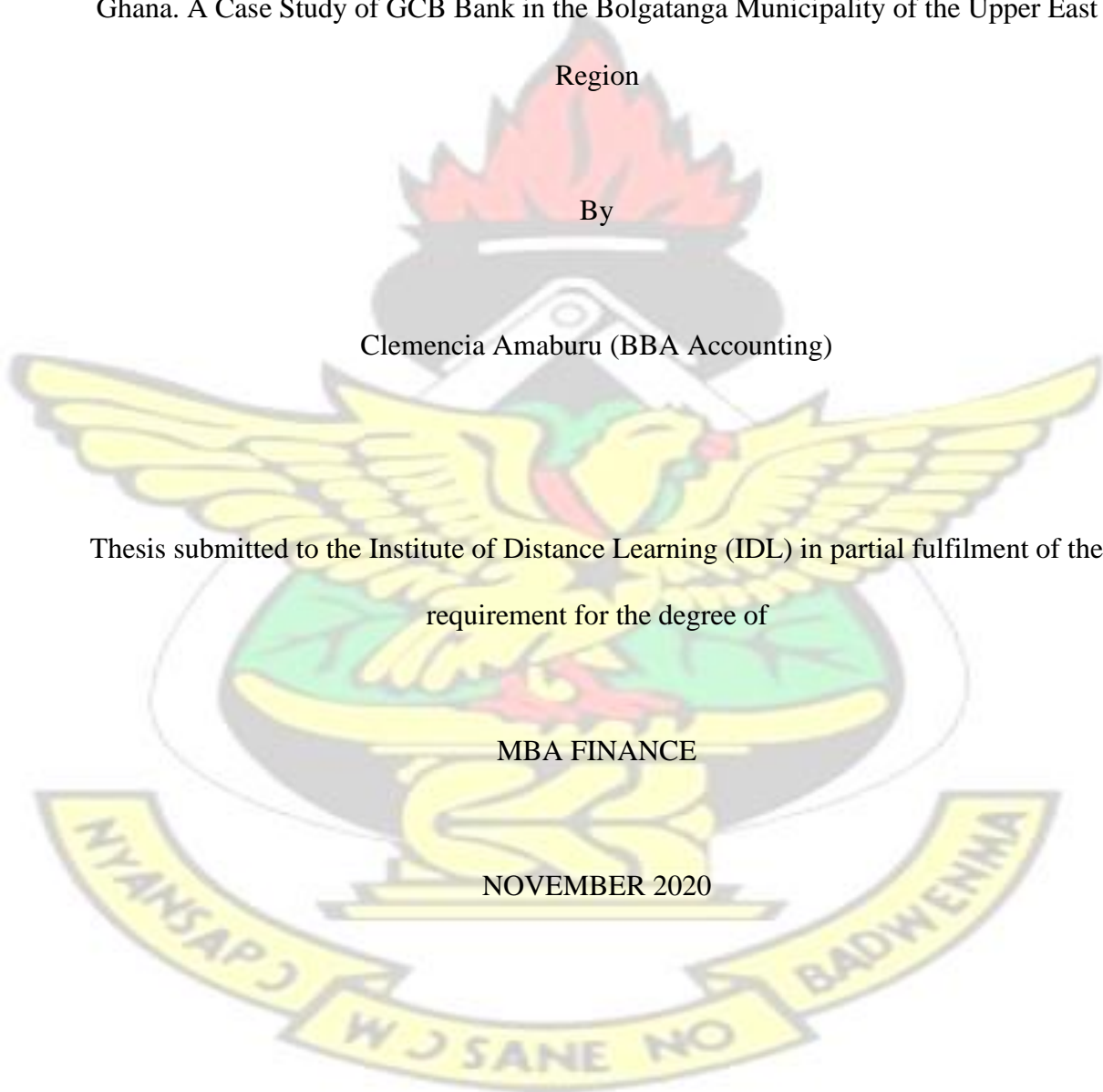
By

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Thesis submitted to the Institute of Distance Learning (IDL) in partial fulfilment of the  
requirement for the degree of

MBA FINANCE

NOVEMBER 2020



## DECLARATION

I hereby declare that this submission is my own work towards the award of Masters in Business Administration (MBA) and that, to the best of my knowledge, it contains no material previously by another person or any material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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Signature

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## ABSTRACT

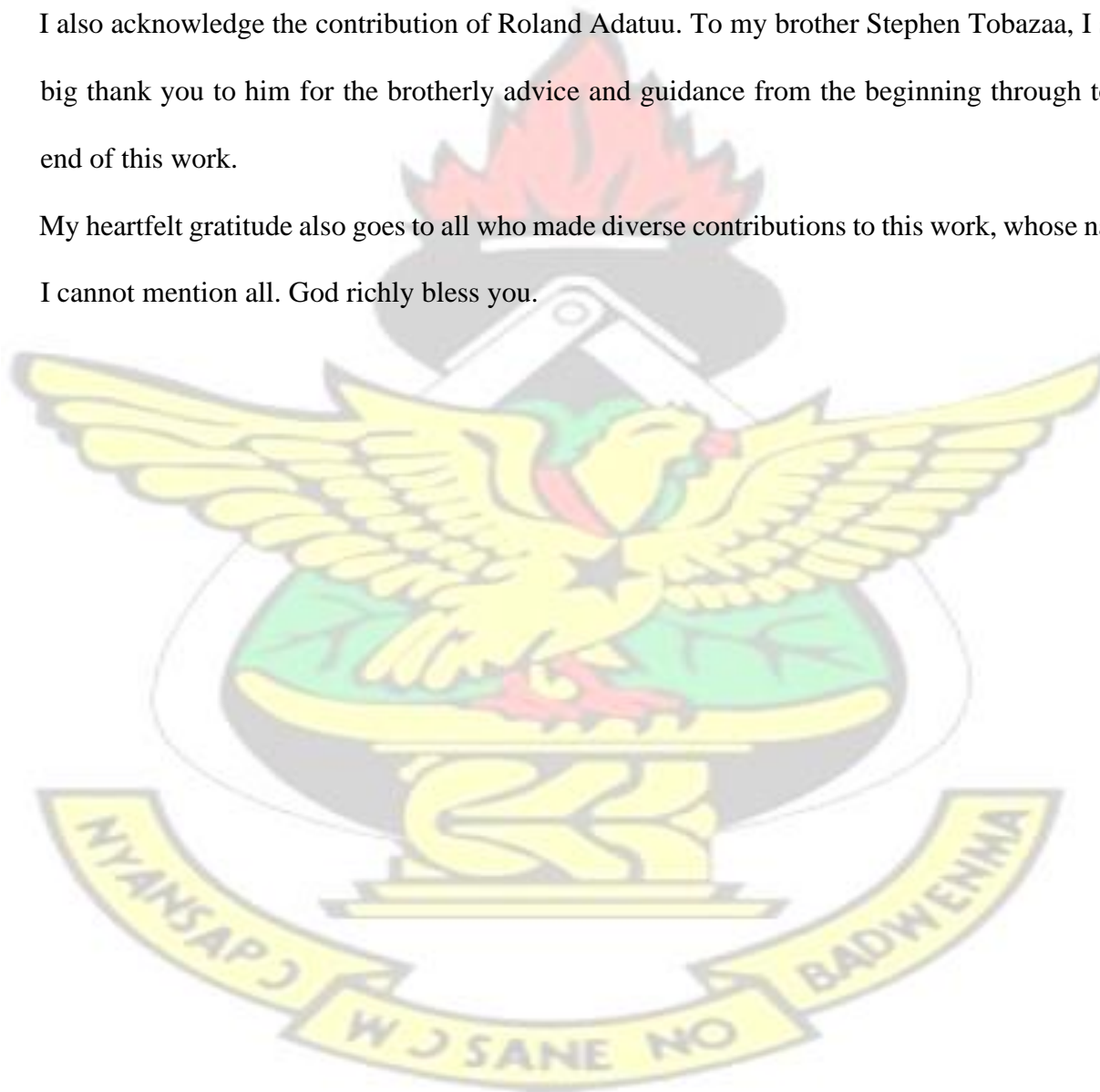
This study assessed the risks and benefits associated with mobile banking technology in Ghana with a focus on the GCB Ltd in the Bolgatanga Municipality. Using a survey approach, the study used a descriptive method involving the use of questionnaire, focus group discussions and key informant interviews guides as the main tools for data collection. The data analysis was qualitative and quantitative. The study found out that the risks associated with GCB mobile banking are the existence of a backdoor that allows secret entry points into the mobile banking programs without normal security check, programmers break into the mobile banking system to transfer customer funds and unauthorized persons gaining access to the mobile banking systems of the bank when users leave their phones logged on. Meanwhile, the benefits of the GCB mobile banking are convenience of the banking system, the mobile banking system creates easy accessibility for users. GCB mobile banking reduces the rural-urban divide of communities. The challenges associated with GCB mobile banking are security, economic, social and network challenges. The study therefore, concludes that for GCB to improve their mobile banking system, there is need for the adoption of two strategies: encryption and isolation in order to avert possible criminal attacks. The study recommended that security challenges such as third party intrusion, hacking, loss of privacy, should be addressed by the bank by employing more competent and expert staff that can encrypt and create awareness among users, , cost of the GCB mobile money banking services should be waived by the bank, GCB and other banks should build trust and confidence among their customers and GCB banking should purchase the latest technological devices that provide reliable network to customers.

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I also acknowledge the contribution of Roland Adatuu. To my brother Stephen Tobazaa, I say a big thank you to him for the brotherly advice and guidance from the beginning through to the end of this work.

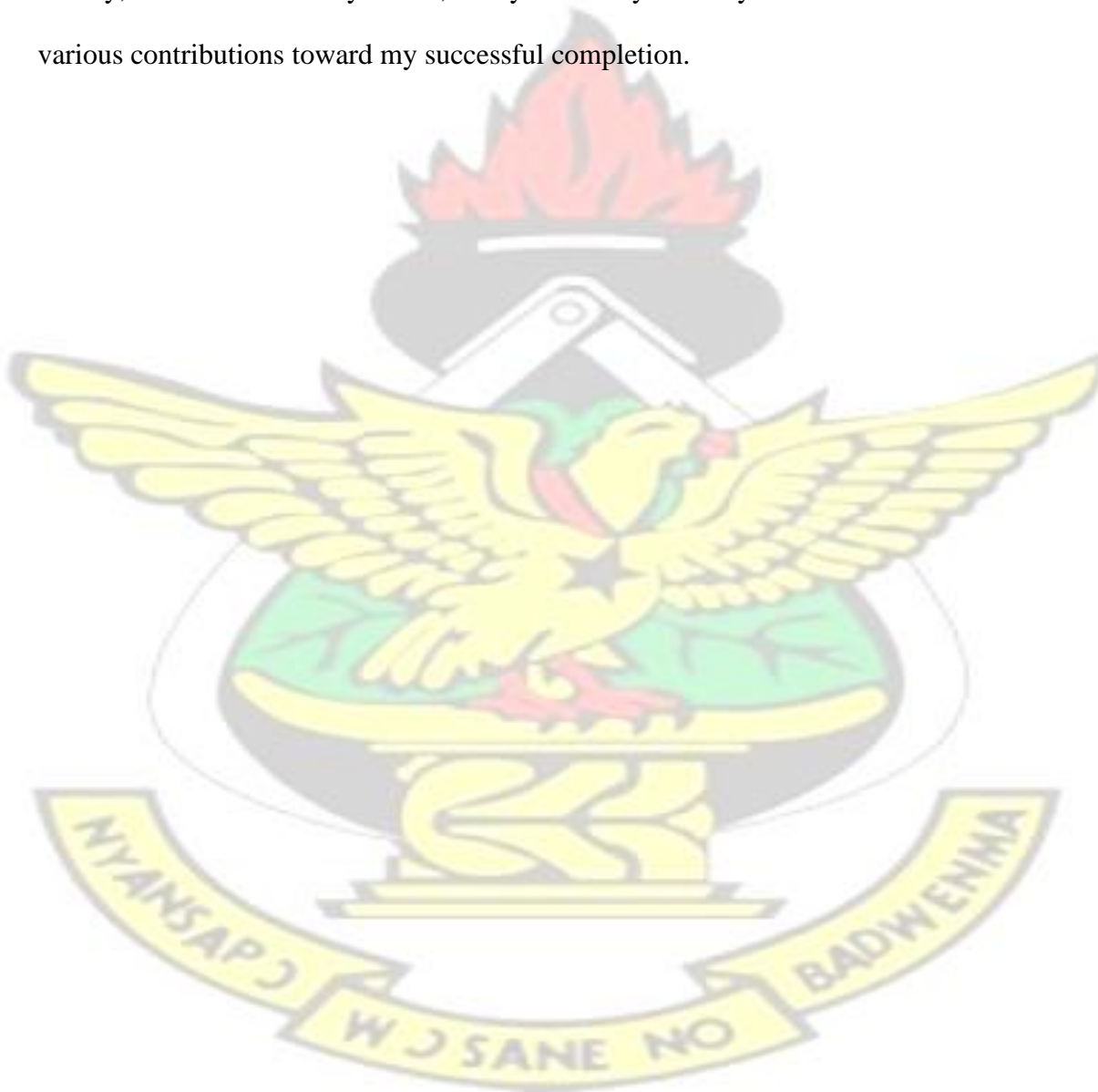
My heartfelt gratitude also goes to all who made diverse contributions to this work, whose names I cannot mention all. God richly bless you.



## DEDICATION

This study is dedicated to my lovely husband, Johannes Atinga Apee, who contributed both financially and materially to ensure that this work comes to successful completion. I also wish to dedicate the work to my children, Raphael and Joshua, for their love and support during the compilation of this study.

Finally, I wish to thank my friend, Evelyn Dambayi and my sister Joana Rita Tembil for their various contributions toward my successful completion.





## TABLE OF CONTENTS

DECLARATION .....	ii
ABSTRACT .....	iii
ACKNOWLEDGEMENTS .....	iv
DEDICATION .....	v
LIST OF TABLES .....	xi
LIST OF FIGURES .....	xii
LIST OF ABBREVIATIONS .....	xiii
CHAPTER ONE .....	1
INTRODUCTION .....	1
1.0 BACKGROUND OF THE STUDY .....	1
1.1 PROBLEM STATEMENT .....	3
1.2 OBJECTIVES OF THE STUDY .....	4
1.3 RESEARCH QUESTIONS .....	5
1.4 SIGNIFICANCE OF THE STUDY .....	5
1.5 SCOPE AND LIMITATIONS .....	6
1.6 ORGANIZATION OF THE STUDY .....	6
CHAPTER TWO .....	7
LITERATURE REVIEW .....	7
2.0 INTRODUCTION .....	7
2.1 CONCEPTUAL REVIEW .....	7

2.1.1 Risks.....	7
2.1.1.1 Mobile Banking Technology Risk .....	8
2.1.1.2 Malwares .....	9
2.1.1.3 System Hacking .....	9
2.1.1.4 Unauthorized Access.....	10
2.1.1.5 Mobile Fraud.....	10
2.1.2 Benefits .....	10
2.1.2.1 Benefits of Mobile Banking Technology.....	11
2.1.3 Mobile Banking.....	12
2.1.4 Challenges to Mobile Banking Technology.....	13
2.1.4.1 Security .....	14
2.1.4.2 Economic Factors.....	14
2.1.4.3 Social Factors .....	15
2.1.4.4 Infrastructure .....	15
2.1.5 Strategies to Help Improve Mobile Banking Technology .....	16
2.1.5.1 Two factor Authentication .....	16
2.1.5.2 Encryption.....	17
2.1.5.3 Permission Based Access.....	17
2.2 THEORETICAL REVIEW.....	18
2.2.1 Trust and Perceived Risk (TPR) .....	18
2.2.2 Relative Advantage and Trust.....	19
2.2.3 Convenience and Trust.....	19
2.3 EMPIRICAL REVIEW.....	20
2.3.1 Risks Associated with Mobile Banking .....	20

2.3.2 Benefits Associated with Mobile Banking.....	21
2.3.3 The challenges Militating Mobile Banking .....	22
2.3.4 Strategies that will help Improve Mobile Banking .....	23
2.4 CONCEPTUAL FRAMEWORK .....	24
Figure 2.1: Mobile Money Banking Technology.....	24
CHAPTER THREE.....	26
RESEARCH METHODOLOGY .....	26
3.0 INTRODUCTION .....	26
3.1 RESEARCH DESIGN .....	26
3.2 POPULATION OF THE STUDY .....	26
3.3 SAMPLE SIZE AND SAMPLING TECHNIQUE(S).....	27
3.4 DATA COLLECTION .....	29
3.4.1 Questionnaire .....	29
3.4.2 Focus Group Discussions.....	29
3.4.3 Key Informant Interviews .....	30
3.5 DATA ANALYSIS.....	30
3.6 RELIABILITY AND VALIDITY OF DATA (PRE-TEST).....	<b>Error! Bookmark not defined.</b>
3.7 ETHICAL CONSIDERATION .....	32
3.8 ORGANIZATIONAL PROFILE.....	32
CHAPTER FOUR.....	34
DATA ANALYSIS, PRESENTATION AND DISCUSSION .....	34
4.0 INTRODUCTION .....	34

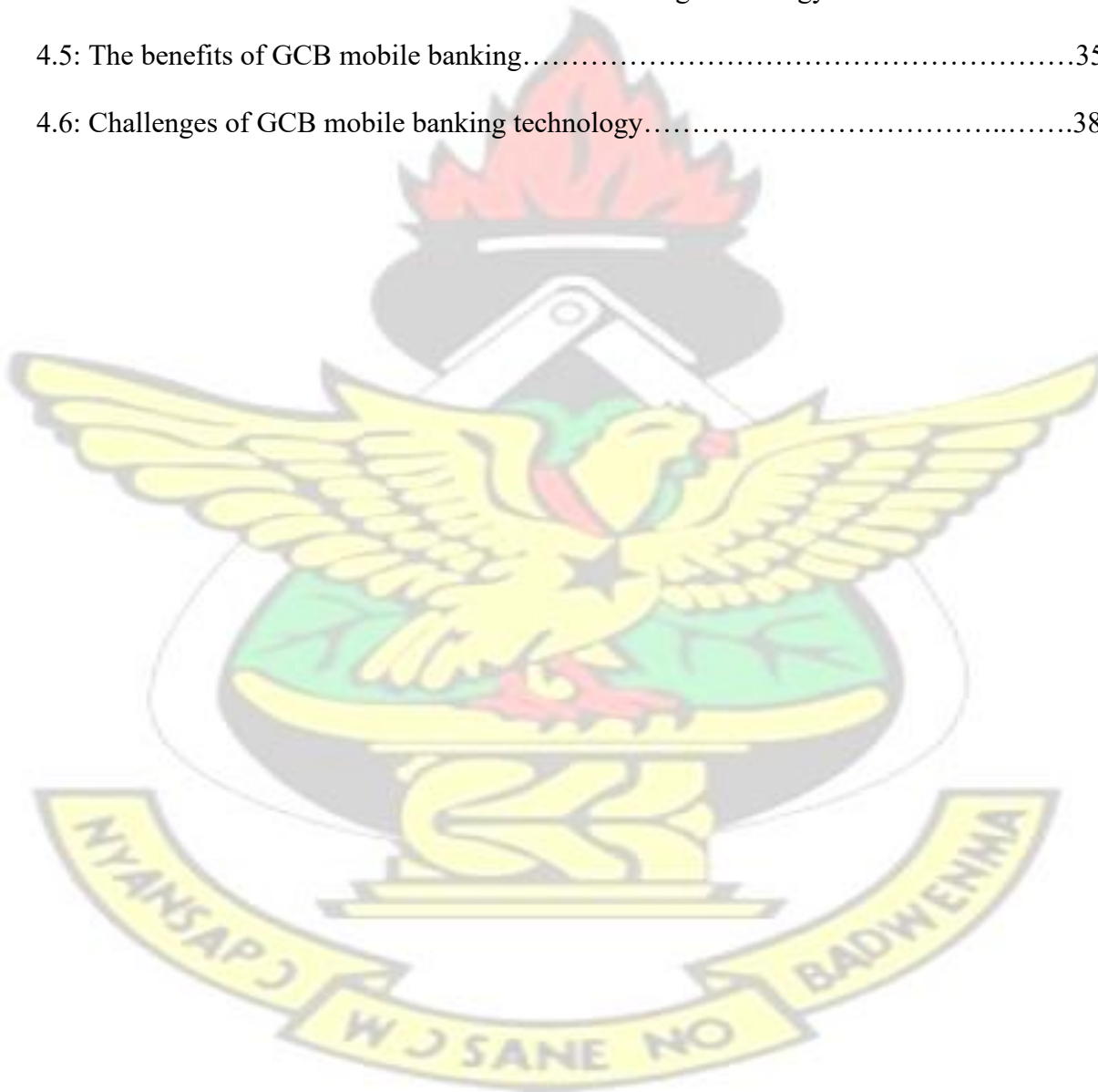


4.1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS.....	34
4.2 The risks associated with GCB bank mobile banking .....	37
4.3 The benefits associated with GCB bank mobile banking in the Bolgatanga Municipality .....	40
4.4 Challenges to GCB bank mobile banking.....	42
4. 4.1 Security factors .....	43
4.4.2 Economic factors.....	44
4.4.3 Social Factors .....	44
4.4.4 Network factors.....	45
4.5 Strategies to improve GCB mobile banking .....	46
4.5.1 Perception on the Use of data encryption sensitive data as a strategy to improve GCB mobile banking.....	46
4.5.2 Respondents' perception on the Use of data encryption to achieve a high level of security as a strategy to improve GCB mobile banking .....	47
4.5.3 Respondents Perception on the Use of bank's issued mobile phone handsets to enhance security as a strategy to improve GCB mobile banking .....	47
4.5.4 Respondents Perception on the Use of banks issued SIM CARDS to enhance security as a strategy to improve GCB mobile banking .....	48
4.5.5 Respondents Perception on the .....	49
CHAPTER FIVE.....	51
SUMMARY, CONCLUSION AND RECOMMENDATIONS .....	51
5.0 INTRODUCTION .....	51
5.1 SUMMARY .....	51
5.1.1 The risks that are associated with mobile banking technology in GCB bank in Bolgatanga. ....	51

5.1.2 The benefits associated with GCB bank mobile banking technology in Bolgatanga. ....	51
5.1.3 The challenges militating GCB bank mobile banking in the Bolgatanga Municipality. ....	52
5.1.4 The Strategies that will help improve GCB bank mobile banking technology in Bolgatanga. .....	53
5.2 CONCLUSION .....	53
5.3 RECOMMENDATIONS .....	54
5.4 RECOMMENDATION FOR FURTHER STUDIES .....	55
REFERENCES.....	56
Gandotra, Bansal & Sofat (2014). Malware Analysis and Classification: A Survey. <i>Journal of Information Security</i> , 05 (02): 56-64, DOI: 10.4236/jis.2014.52006.....	61
APPENDIX I.....	63
APPENDIX II .....	69
APPENDIX III.....	70

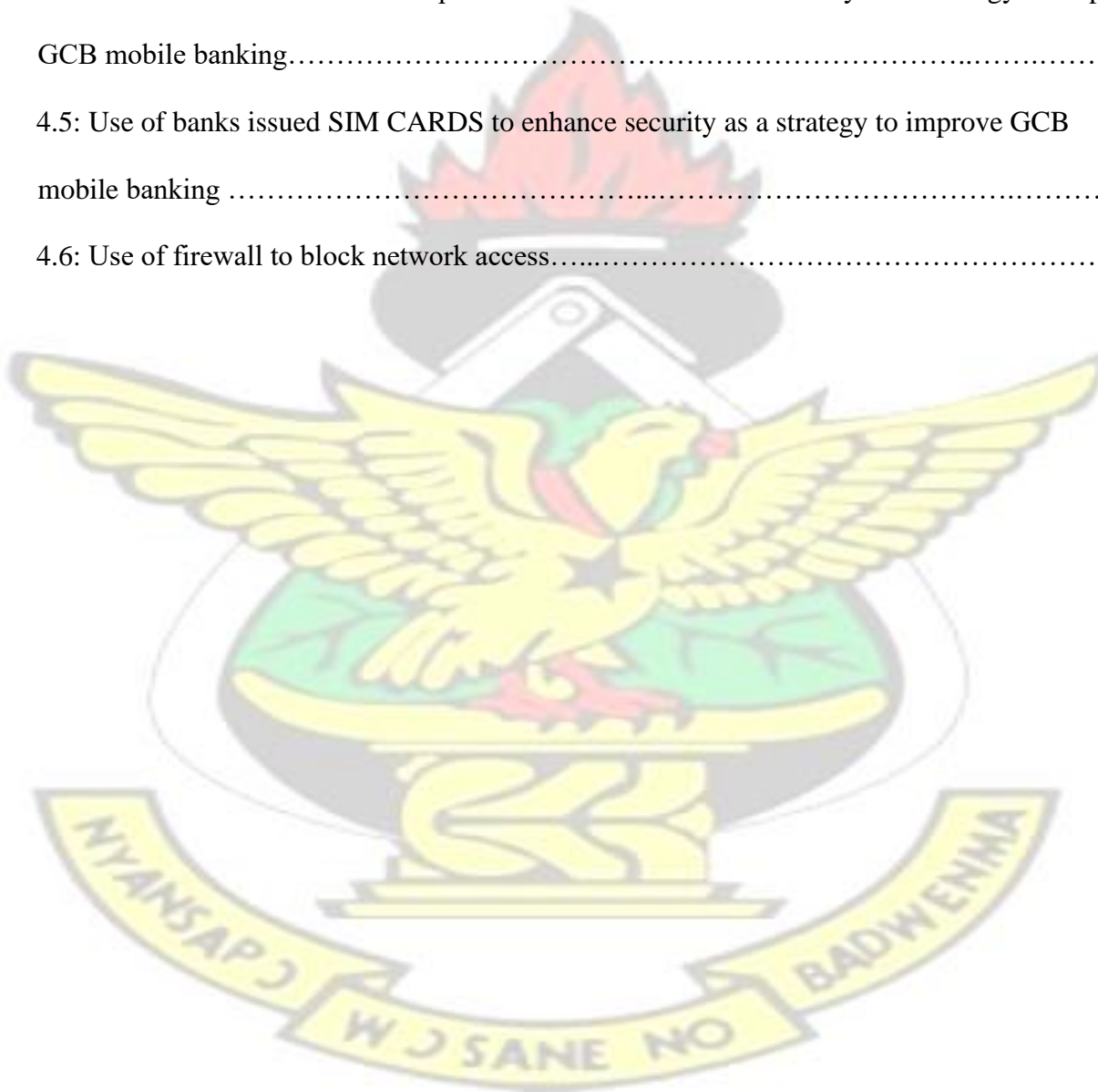
## LIST OF TABLES

4.1 Sex and composition of the respondents .....	27
4.2: Age of the respondents.....	28
4.3: Level of education of the respondents.....	29
4.4: Risks that are associated with GCB mobile banking technology.....	32
4.5: The benefits of GCB mobile banking.....	35
4.6: Challenges of GCB mobile banking technology.....	38



## LIST OF FIGURES

4.1: Banking experience of the banking staff.....	30
4.2: Use of data encryption sensitive data as a strategy to improve GCB mobile banking.....	40
4.3: Use of data encryption to achieve a high level of security as a strategy to improve GCB mobile banking.....	41
4.4: Use of bank's issued mobile phone handsets to enhance security as a strategy to improve GCB mobile banking.....	42
4.5: Use of banks issued SIM CARDS to enhance security as a strategy to improve GCB mobile banking .....	43
4.6: Use of firewall to block network access.....	43



## LIST OF ABBREVIATIONS

CT: Convenience and Trust

GCB: Ghana Commercial Bank

GoG: Government of Ghana

ICT: Information Communication Technology

ID: Identity

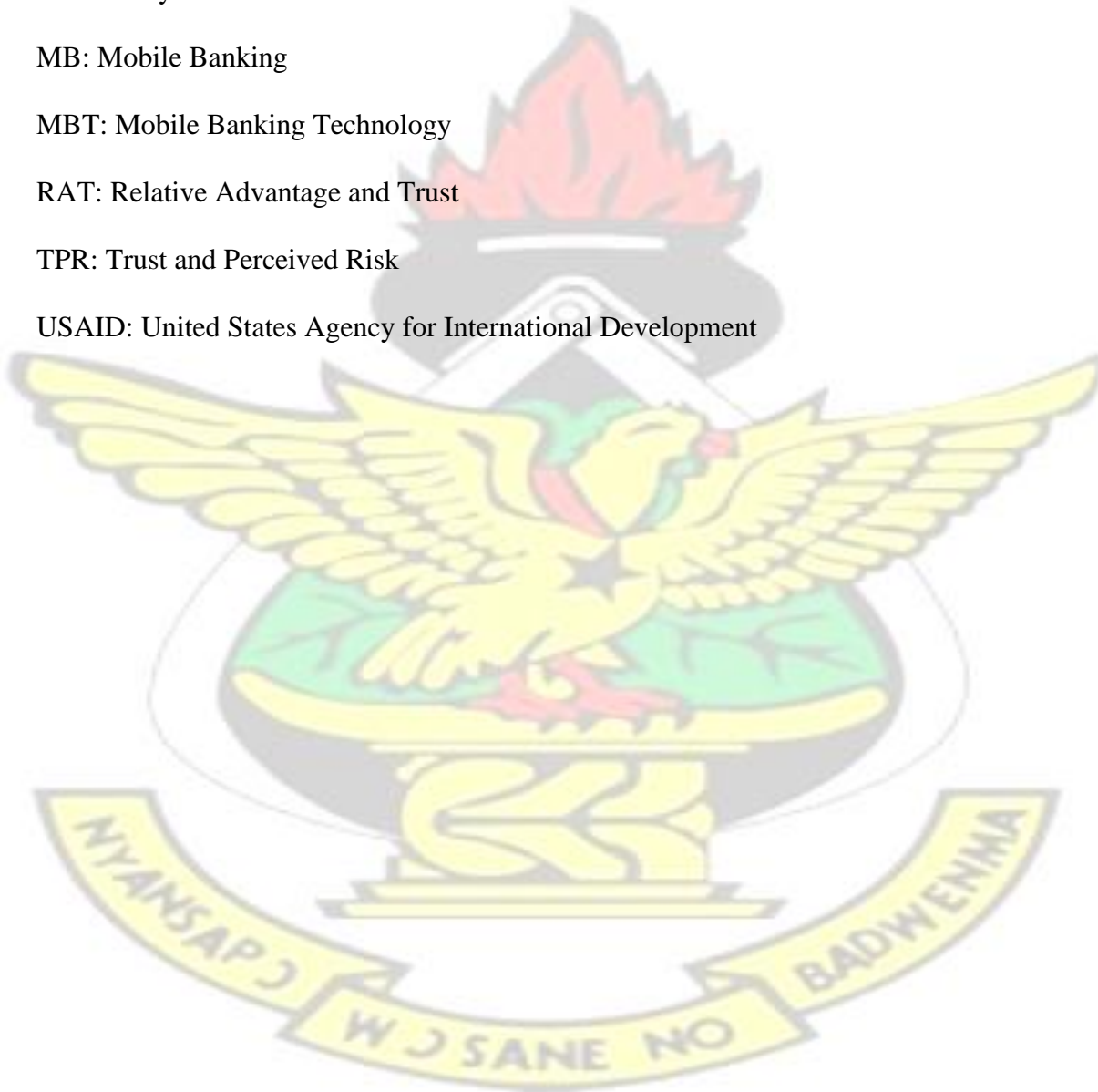
MB: Mobile Banking

MBT: Mobile Banking Technology

RAT: Relative Advantage and Trust

TPR: Trust and Perceived Risk

USAID: United States Agency for International Development





## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 BACKGROUND OF THE STUDY**

Innovation plays a pivotal role in the growth and survival of companies, especially in dynamic and complex markets with uncertain economic circumstances (Cheng, Lee, & Lee, 2014). Mobile technology has emerged as one of the most malleable form of innovation in the last 30 years. The technology provides organizations with multiple platforms for achieving various organizational operations efficiently and effectively. The mobile technology was primarily developed as a voice communication system but with time, mobile phones have evolved to incorporate applications used in machine automation, e-Government services, mobile banking services among others (AlSoufi & Ali, 2014). In fact, the technology has been at the centre stage of business operations' revolution. In the banking sector, Mahad, Mohtar, Yusoff and Othman (2015) assert that the mobile technology has played a critical role in enhancing efficient, access and convenience to the users. The use of mobile technology in the banking sector has moved from mere no transactional tasks such as checking of account balances, viewing of recent account transactions and downloading of bank statements in the early 2000s to more complex transactional task such as funds transfer, bill payments, investment purchase or sale, loan applications and transactions, shopping, donations among others (Priya & Raj, 2015). Joubert and Belle (2013) assert that the rapid development in mobile communication technologies and its high penetration presents an opportunity for growth in the banking sector especially in the developing countries where computer-based internet access is very low. Globally, rapid growth and adoption of smartphone use has become the principal axis for the expansion of mobile banking. According to the Global Mobile Money report 2015, 69% of mobile device users globally carried out banking activities

via their mobile phones in 2015 (MEF, 2016). This is huge considering that worldwide mobile phone penetration stood at 96% in the year 2015 (Mahad, Mohtar, Yusoff, & Othman, 2015). Further, the number of mobile banking users globally is projected to grow by more than 125% by 2019 (KPMG, 2016). In Africa, the 2016 report published by GSMA Intelligence on Africa's mobile economy indicates that at the end of 2015, 46% of the population (more than half a billion people) in Africa subscribed to mobile phone services (GSMA, 2016). The report further shows that in 2015, the number of mobile devices users in Africa who carried out financial transactions on their mobile targets averaged 80% (MEF, 2016). Moreover, the mobile technologies, and services generated 6.7% of Africa's GDP and 3.8 million jobs in 2015(GSMA, 2016).

Globally, the world has become a village resulting from the evolution of Information Communication Technology (ICT). Almost everything is now being done by the use of technology. Thus, the growth of ICT is becoming very crucial in the way businesses and industries are conducted throughout the world. Traditional banking systems are thus, paving way for modern and advanced forms of banking in this 21<sup>st</sup> Century. According to Agbemabiese, Anim and Nyanyofio (2015), the traditional banking system has been in existence for a myriad of decades in both developed and developing countries carrying out different transactions. The authors have however, noted that in recent times, there has been a considerable shift from the traditional banking methods to the use of information communication tools in the banking sector throughout the universe.

Antwi (2015) stated that in Ghana, banks contribute and continue to support the growth and development of nations. Banks have played some interlinking roles to ensure the economy of Ghana is operating to its fullest. Some of these contributions the banks make include but not limited to receiving deposits from clients, consultancy services and lending to businesses and individuals to promote private growth and expansion (Antwi, 2015). In providing these

services timely to clients, Antwi (2015) argued in line with Agbemabiese, Anim and Nyanyofio (2015) that in order for banks to provide easily accessible and attractive services to their clients, in Ghana, banks have adopted such modern methods such as electronic banking or what is commonly referred to as e-banking methods. Ugochukwu (2015) has argued that it is as a result of the increasing competitive financial market that has triggered banks and other financial systems to adopt alternative ways of providing effective, timely and attractive services such as electronic banking.

Arguing further, Ugochukwu (2015) has noted that electronic system of banking in Ghana has innovated the banking system. This allowed customers the opportunity to carry out transactions wherever they are without moving to the banking premises to undertake transactions. Customers can have access to their money 24hrs a day and 7 days a week depending on the amount of money needed without stepping into any banking hall.

One of these e-banking methods which allow customers to transact banking operations while doing their duties wherever they are is mobile banking. Manfred (2017) and Donovan (2012) have asserted that mobile telephony and its adoption and usage has seen a sharp rise especially in many countries in Africa. The researchers added that mobile telephony adoption is also much realized in the banking industry where people enjoy financial services on their mobile phones. Thus, financial and other economic activities have taken a dramatic turn toward the use of phones than using the traditional banking systems (Donovan, 2012).

This study thus, investigates the risk and benefits of mobile banking in Ghana focusing on the GCB bank in the Bolgatanga, the capital of the Upper East Region of Ghana.

### **1.1 PROBLEM STATEMENT**

Nyame-Mensah (2013) has noted that the mobile telephony newly found purpose as a financial intermediary tool is actually projected to create more value for the economies of



many developing countries such as Ghana. This is because it will provide and promote economic growth and financial inclusion. It will also revolutionize business practices and experiences for customers. For the poor, holding cash comes with a high risk because of the high crime wave in most countries such as Ghana. Mobile banking also makes it easy for the poor to make informed decisions about their finances before. Gaffar (2009) has stated that in Ghana, many banks have adopted new innovations and cutting-edge technologies to improve their financial services provision. One of these innovative and cutting-edge technologies banks have adopted in Ghana is mobile banking, m-banking or SMS-banking through the use of telephones. Despite the efforts of banks in using mobile banking to provide more financial services to clients and the benefits associated with it, little is being taken into consideration about the risk associated with mobile banking such as technical and security standards, regulatory and supervisory issues and business and legal issues. Little research has been conducted on the one hand, risks and on the other hand, benefits linked to mobile banking technology especially in the Bolgatanga Municipality of the Upper East Region, hence, the need for this research. This study thus, examines the risks and benefits associated with GCB bank mobile banking technology in the Bolgatanga Municipality in order to bring out the continuities and discontinuities.

## **1.2 OBJECTIVES OF THE STUDY**

To examine the risks and benefits using mobile banking technology in GCB bank in Bolgatanga.

1. To find out the risks that are associated with mobile banking technology in GCB bank in Bolgatanga.
2. To examine the benefits associated with GCB bank mobile banking technology in Bolgatanga.

3. To investigate the challenges militating GCB bank mobile banking in the Bolgatanga Municipality.

4. To find out the strategies that will help improve GCB bank mobile banking technology in Bolgatanga.

### **1.3 RESEARCH QUESTIONS**

What risks and benefits are associated with GCB bank mobile banking in the Bolgatanga?

1. What are the risks associated with GCB bank mobile banking in Bolgatanga?
2. What benefits are associated with GCB bank mobile banking in Bolgatanga?
3. What challenges faces GCB bank mobile banking in Bolgatanga?
4. What strategies will help improve GCB mobile banking in the Bolgatanga Municipality?

### **1.4 SIGNIFICANCE OF THE STUDY**

This report provides the needed information that will give insight to customers to patronize GCB bank mobile banking technology in Ghana and more specifically in the Bolgatanga Municipality. It will provide adequate data about the risks and benefits of GCB banking technology.

Additionally, the report will give insight to GCB bank to know the risks that are involved in using mobile banking technology in providing financial services to customers. It will enable GCB bank appreciate the pros and cons of the services they provide to customers in order to minimize the risks that are involved.

Government will also benefit from this study because it will enable government understand the risks that are involved in mobile banking in the country so pragmatic measures can be taken to reduce the risks. Government will also understand the benefits mobile banking provides so as to capitalize on these benefits to formulate policies that promote mobile



banking in Ghana. It will help mobile network operators and policy makers in taking well-informed decisions when expanding mobile networks to some areas in Ghana.

The research provides the foundation for more researchers to delve into mobile banking technology research in the country and more specifically, Bolgatanga to conduct further research in the area. Researchers in this line of study will use it as a baseline to conduct more research into mobile banking in the Upper East Region and Ghana as a whole.

### **1.5 SCOPE AND LIMITATIONS**

This research only examines risks and benefits that are associated with GCB bank mobile banking technology in the Bolgatanga Municipality. It is also only limited to the Bolgatanga Municipality with participants limited to the GCB bank.

### **1.6 ORGANIZATION OF THE STUDY**

The research will have five chapters. The first chapter will include an introduction which contains the background information, statement of the problem, objectives of study, the questions guiding the study, the scope and limitations as well as the relevance of the research, and finally organization of the chapters. Chapter two is literature review. It will be made up of the conceptual framework and theoretical framework. Chapter three will be the Research Methodology. The fourth chapter will comprise of the data analysis and presentation. Chapter five will comprise the summary, conclusion and recommendations.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 INTRODUCTION**

Chapter two examines conceptually, risks and benefits associated with mobile banking. It also gives the definition of mobile banking within the contexts of the research and relevance of the concepts to the study. Further, the study examines the theories underpinning mobile banking and adopts the theory that fits this study. Empirically, the chapter examines studies which fell within the purview of the research objectives of this study. Finally, the study provides a conceptual framework with some explanations.

#### **2.1 CONCEPTUAL REVIEW**

This section provides a conceptual review of the study. It begins with the definition of what constitutes risk within the mobile banking technology followed by the benefits of mobile technology and finally what mobile banking technology is. These concepts are defined as below.

##### **2.1.1 Risks**

Possibility of loss or something unpleasant happening because of use or association with a given technology or item.

According to Antwi (2015), risk is the potential of something that will occur in a bad manner. It involves or reflects the implications or consequences that will take place when the thing occurs in a bad manner. Risk involves what human beings cherish or value so much such as health, wealth, property or the environment in which human beings live.

Baganzi and Lau (2017) examined risk in four major ways. In the first, the dictionary defines risk as the likelihood that something that is bad or negative is going to occur or happen which is caused by either internal or external forces which can be mitigated through prompt action.

This definition has many commonalities with the Antwi's (2015) definition. In the second strand, Baganzi and Lau (2017) defined risk in financial terms as an actual return in investment that is lower than what was actually expected. Defining risk this way indicates that financial risk is classified into underwriting, sovereign, basic, settlement, capital, country, reinvestment, default, delivery, economic, exchange, interest rate, liquidity, operation, payment system, political, and refinancing risks.

The third definition according to Baganzi and Lau (2017) relates to the food industry where in the existence of food hazard, there can be some negative consequences to a certain magnitude. The last definition relates to the insurance industry where the likelihood that a variable such as fire burning down a building is known but the mode or time of occurrence is not known.

Antwi (2015) defines risk in financial terms just as in the case of Baganzi and Lau (2017). Antwi (2015) defined risk as the probability that an investment's returns are different from the actual expected returns. Risk in this sense means losing part of or all the initial investments. For the purposes of this study, risk is defined in line with Antwi's (2015) definition as the probability of an investment's returns different from the actual expected returns.

#### **2.1.1.1 Mobile Banking Technology Risk**

Antwi (2015) has opined that since the novel mobile banking industry took the centre stage of financial transactions, increasingly, there have arisen some security threats in the industry such as hackers and fraudsters making away with peoples' money. Thus, most mobile banking technologies have adopted security and privacy features. This indicates that mobile banking technologies are not insulated from risk cases of theft, fraud and scamming.

Baganzi and Lau (2017) have therefore, defined mobile banking risk as the probability that a mobile banking user may experience some unexpected events when transacting business.

They explained that mobile banking risk involves the likelihood that a mobile banking client may lose or incur some financial losses or some information using mobile banking technology. It clearly describes the fears that mobile banking users have in the process of engaging in financial transactions using a mobile banking technology. For the purposes of this study, mobile banking technology risk is defined in line with Baganzi and Lau (2017).

#### **2.1.1.2 Malwares**

A malware is any type or form of computer-based software intended to gain access to a computer systems or networks with the aim of disturbing computer operations or gathering personal information without taking the consent of system's owner (Gandotra, Bansal, & Sofat, 2014). Therefore, they are programs that intentionally exploit vulnerabilities in computing systems for a harmful purpose (Elhadi, Maarof, & Barry, 2013). He, Tian and Shen (2015) write that with increased usage of mobile banking, mobile malware has been increasing in frequency and sophistication. This has caused a lot of damages including leaking of sensitive financial data, financial loss and identify theft.

#### **2.1.1.3 System Hacking**

Unlike malwares where the program is released to collect information or interfere with computer operations, hacking requires an active involvement of a human being. In simpler terms, malwares are designed to act on behalf of the creator while hackers directly modify or interfere with a computer system. Hence, Farsole, Kashikar and Zunzunwala (2010) define hackers as a person who like to tinker with software or electronic systems. That is, a radical programmer who aggressively explores creative solutions to problems. These programmers may use their talents to subvert criminal activities or for malicious and illegal purposes (Falk, 2014).



#### **2.1.1.4 Unauthorized Access**

The distinction between hacking and unauthorized access is that the latter involves gaining access to a computer system by improper means while unauthorized access describes gaining access to a computer system using usual means of access but without consent (Morgan, 2015). Unauthorized access includes gaining access to someone else's authentication code and using it to access a system or simply gaining access to a computer system when the user carelessly leaves it logged on. This has mainly been attributed to customers' widespread use of static passwords which can be guessed, forgotten, written down and stolen, or eavesdropped (Hayikader, Hadi & Ibrahim, 2016).

Customers are particularly worried of their accounts being accessed through their personal account details by way of stolen PIN codes (Mahad, Mohtar, & Othman, 2016).

#### **2.1.1.5 Mobile Fraud**

The term fraud has drawn varied definitions. Sharma and Panigrahi (2012) posit that fraud entails wrongful or criminal deception intended to result in financial or personal gain. Phua, Lee, Smith and Gayler (2005) defined fraud as any activity that leads to the abuse of a profit organization's system without necessarily leading to direct legal consequences. However, Wang, Liao, Tsai and Hung (2006) expanded the definition to mean deliberate acts that are contrary to law, rule, or policy with intent to obtain unauthorized financial benefit and intentional misstatements or omission of amount by deceiving users of financial statement.

#### **2.1.2 Benefits**

According to Antwi (2015:5), a benefit refers to a state, opportunity, circumstances or a situation that provides a favourable means of success or achieving a desired end. A benefit can also mean "a payment or gift, as one made to help someone or given by an employer, an insurance company, or a public agency." The Marriam-Webster dictionary defines a benefit as "something that produces good or helpful results or effects or that promotes well-being."



Similar to the Antwi's (2015) definition, Baganzi and Lau (2017) defines a benefit as "a helpful or good effect, or something intended to help." Subsuming from the definitions above, a benefit in the mobile banking technology will mean and for the purposes of this study, a service or product that gives customers an advantage of reaching their desired end quickly.

#### **2.1.2.1 Benefits of Mobile Banking Technology**

Pankomera and Van Greunen. (2018) categorized the benefits of mobile banking technology into five. These are convenience and accessibility, reduced carrying of cash, promotion of financial inclusion, reduced urban-rural divide and reduced inequality and poverty. In terms of convenience and accessibility, Pankomera and Van Greunen. (2018) have argued that mobile banking technology reduces time and access to financial services. They author went further to state that mobile banking technology is beneficial because it reduces the risk of financial loss because it does not allow for the handling of plenty cash. Mobile banking technology also allows several people to have access to financial services where traditional banking services do not exist. In relation to urban-rural divide, Pankomera and Van Greunen. (2018) have stated that mobile banking technology allows both urban and rural dwellers to have access to banking services and products. And lastly, Pankomera and Van Greunen. (2018) argued that mobile banking technology has proven in the Ghana situation that the technology has improved the economic wellbeing of people using mobile banking technology. Rahmani, Tahvildari, Honarmand, Yousefi and Daghighi (2012) also found five benefits of mobile banking technology just in the case of Pankomera and Van Greunen. (2018). Rahmani, Tahvildari, Honarmand, Yousefi and Daghighi (2012) found mobility of access to cash anywhere, location, convenience, customization, and identity ability as the benefits of mobile banking technology. According to Rahmani, Tahvildari, Honarmand, Yousefi and Daghighi (2012), mobile banking technology allows customers to have access to their money anywhere

they are. It is also convenient for a customer to have access to cash without necessarily walking to the banking hall, it is customer friendly and allows the customer to easily be identified by the bank.

Bećirović, Bajramović, and Ahmatović 2011) identified four benefits of mobile banking technology. These are it saves time, saving of money for fuel and parking when a customer has to drive to a bank to access services, financial transactions can be done 24 hours every day, and mobile banking provides customers with accurate information. Bećirović, Bajramović, and Ahmatović 2011) realized that using mobile banking technology saves time because a customer does not need to go to the bank before accessing a service or product and thereby saves money for fuel and parking when driving to the bank. Mobile money technology also allows for transactions to be done throughout the day unlike the traditional system where banks are closed in the evening and opened in the morning. Besides, the technology also provides accurate information for customers who use it.

### **2.1.3 Mobile Banking**

Mobile banking defines the provision and execution of banking and financial services through the help of mobile telecommunication devices such as the telephone or tablets (Okiro & Ndungu, 2013).

According to Baganzi and Lau (2017) mobile banking refers to a system that allows for the transfer of money from a bank using a mobile phone. It uses information communication tools and channels to provide financial services to people who cannot use the conventional banking system. Mobile banking services speed up financial transactions as money is transferred electronically rather than physically. To transfer or receive money, a mobile phone user registers a SIM card with a mobile money agent. The user further registers with a bank where

he or she has a bank account and starts to deposit and transfer money. Baganzi and Lau (2017) went further to state that the money deposited is known as e-money in an e-wallet.

Baganzi and Lau's (2017) definition is similar to USAID (2010). USAID (2010:1) defined mobile banking as "... the term used for using a cell phone to receive or deposit money using a cell phone where value can be stored on an "m-wallet" before and after the transaction. A sender loads money into his m-wallet by going to a registered "agent" (sometimes a financial institution); then the sender can use a secure electronic approach to transfer funds from the bank to his or her wallet or to the bank.

Nyame-Mensah (2013) stipulated that mobile money or mobile phone banking is often also referred to as m-banking or m-commerce. This is a technology which forms part of the branchless form of banking. It is defined as the use of mobile phones and personal digital assistants or other portable digital devices which are linked to an information communication technology which allows for financial transactions which are connected to a persons' (bank) account. From the above definitions and for the purpose of this study, mobile money banking is in line with this definition.

#### **2.1.4 Challenges to Mobile Banking Technology**

According to Santhosh and Babu (2019), mobile banking technology relates to the issues that making mobile banking difficult for both customers and banks. They mentioned a number of challenges facing mobile banking technologies. In the first place, Santhosh and Babu (2019) mentioned questionable security as a challenge to mobile banking. They noted that about 90% of all mobile banking technologies have security challenges. These technologies such as applications leave both banks and customers vulnerable to hackers. They also found bad network connections as some of the challenges. Network interruptions leave many customers frustrated and this affects their trust for the technology. Lastly, Santhosh and Babu (2019)



identified bankers' inability to understand banking technologies applications as a challenge to mobile banking technologies.

Similar to Santhosh and Babu (2019), Bamoriya (2016) also found some challenges facing mobile banking technologies. These challenges include security issues. According to him, many customers have the perception that their accounts are not safe and are prone to cyber criminals. Also, mobile banking technology is also saddled with interoperability issues that is to say the banking technology lack standards and protocols. The author also noted that mobile banking technology is also faced with privacy issues as customers believe there can be a disclosure and personal information sharing with others. For the purposes of this study, Santhosh and Babu (2019) definition of challenges of mobile banking technology is adopted.

#### **2.1.4.1 Security**

Security is the biggest challenge facing the mobile banking world. The use of wireless technology creates a risk that information will be stolen, therefore service providers have to employ the use of highly secure encryption technology to prevent third party data intrusion and losses. Venable Telecommunications (2008) argue that the ubiquitous tools of mobile banking open the door to enormous potential for monetary as well as reputation risk, hence mobile banking service providers have to provide security which is commensurate with the size of the financial institution as well as the complexity of the products and services offered. The mobility of the mobile handset and the nature of wireless communications make it difficult to authenticate a customer, hence this becomes a security concern as well for both the banks and their customers.

#### **2.1.4.2 Economic Factors**

Price of a technology is an important factor that influences the utilization of the technology. In times of increased competition, a distribution channel must organize business processes efficiently so as to reduce distribution costs. In Mobile Banking, there are three costs: normal

costs associated with mobile phone providers' activities, the bank cost and charges and the cellular phone cost. The cost of mobile devices though a one-off cost, makes Mobile Banking as costly as other banking. If the cost of mobile devices is very high, this discourages account holders from acquiring them hence impeding the utilization of Mobile Banking services, Chavidi *et al* (2004).

#### **2.1.4.3 Social Factors**

Conceptualizing electronic money refers to how comfortable people are with electronic money. Donner and Tellez (2008) argue that people coming to banking for the first time via the mobile handset require a command of abstract concepts about invisible or virtual money. Beliefs, misunderstandings, habits, and concerns must be addressed if people who are used to storing money in cash are asked to store it in a handset. It may therefore, be quite a task convincing them that the handset will operate like a wallet thus affecting mobile banking adoption. Hence, adoption will depend on how comfortable a person is with virtual money. Rogers (2013) points out that people react differently to innovation based on their perceived risk of that innovation.

#### **2.1.4.4 Infrastructure**

Mobile money transfer is experiencing rapid growth in recent times across the globe. However, upon all the success story of MMT service, there are some potential challenges facing the sector which is affecting the adoption and penetration rate as expected. According to Inter Media (2013:9) research on MMT show that mobile Money has several barriers which inhibit its growth. Poor and unreliable network connectivity is one factor affecting the MMT service (TCRA, 2013). Mostly, due to network connectivity failures, the service is characterized by a message stating that service is not available please keep trying or try again later and affect the operation of MMVs in the industries.



### **2.1.5 Strategies to Help Improve Mobile Banking Technology**

Santhosh and Babu (2019) in their study titled *A study on prospects and challenges of Mobile Banking in India* stated that strategies in improving mobile banking technology refer to the means and ways by which banks can adopt to provide more effective and efficient banking services to their customers. The authors noted that some of these strategies include providing security to customers such as users ID or PIN authentication, encryption of the data that is transferred over the air and encryption of data that is stored in devices for use later. In Ethiopia, Asfaw (2015) also found data security as a major strategy that will enhance mobile banking technology.

As technology continues to evolve with time, it is mandatory for security protocols and procedures to update for users and organizations to continue enjoying its benefits without being concerned about any sort of threats (Gupta, 2015). Several strategies have been adopted by banks to mitigate the threats associated with mobile banking. The current study explores how two-factor authentication, encryption, isolation and permission-based methods have been used by commercial banks in Ghana to control the prevailing mobile banking risks.

#### **2.1.5.1 Two factor Authentication**

As the use of mobile banking increases, the security and privacy threats of mobile banking through malwares, hacking, unauthorized access and mobile fraud increases. In this context, the traditional login and password authentication is considered insufficient in securing critical applications such as online and mobile banking, while two-factor authentication schemes promise a higher protection level by extending the single authentication factor (Dmitrienko, Liebchen, Rossow, & Sadeghi, 2014). A study by Musaev and Yousoof (2015) to review mobile banking security in Oman shows that two-factor authentication has proven to be a

secure method for customer verification as it requires the customers to produce additional authentication together with their unique login identification and password.

#### **2.1.5.2 Encryption**

Confidentiality of data transmitted through the internet can be achieved by cryptography.

According to Soofi, Khan and Fazal-e-Amin (2014) data cryptography is the shuffling of the content of the data, such as text, image, audio, video to make the data meaningless, unreadable or invisible during transmission or storage. The process of transforming data into cipher text is called encryption while the process of reversing the cipher text back to its original form is called decryption. The process of encrypting the data with a secret key before exchange or transmission provide another level of secure communication between the sender and receiver (Singh & Jauhari, 2012). This conceals the confidentiality of the data and improves on the data security.

#### **2.1.5.3 Permission Based Access**

Hayikader et al. (2016) define permissions-based access control to involve granting a set of permissions to each application and then limiting each application to accessing device data/systems that are within the scope of those permissions and blocking the applications if they attempt to perform actions that exceed these permissions. Putting this into the perspective of mobile phone applications, Felt, Greenwood and Wagner (2011) writes that in order to protect users from the threats associated with third-party codes, modern mobile platforms use application permissions to control access to security and privacy relevant parts of the systems. The smartphones are programmed such that users can decide whether to allow individual applications to access sensitive resources.

## **2.2 THEORETICAL REVIEW**

This section reviews theories related to mobile banking. It examines the Trust and Perceived Risk (TPR), Relative Advantage and Trust (RAT) and Convenience and Trust (CT) theories which are associated with mobile banking. The section begins with the TPR, followed by the RAT and ends with the CT.

### **2.2.1 Trust and Perceived Risk (TPR)**

According to Makangoro (2014), trust is linked to ability, integrity and goodwill while perceived risk is associated with security, psychological and privacy. Makangoro (2014) went further to state that Curral and Judge (1995) earlier defined trust to relate to the phenomenon of a customer to depend on a bank under the conditions of dependence and risk. Linking the two variables, perceived risk is seen as a limitation of using a technology while on the other hand trust is the willingness or readiness of a consumer or customer to assume risk of patronizing a service or product. Makangoro (2014:21) explains the foregoing statements that “This means that there is no risk taken in a customer’s willingness to trust but by accepting and using mobile banking the user is already taking a risk and accepting the outcome.”

By implication, this means that if a service or a product fails, the customer or user had already put himself or herself in a state of vulnerability and therefore will have to face the consequences thereof. It stands to be understood therefore that these two variables are linked up in one way or the other because they are negatively correlated. If a user or customer trusts a mobile banking service, that user has already accepted the risk that later, if the service fails, he or she stands to suffer the consequences. Thus, the level of a user’s trust for a mobile banking service influences the user’s adoption and use of that service.



### **2.2.2 Relative Advantage and Trust**

TAR is related directly to time and cost. A user depends on cost of a mobile banking product/service to determine whether he or she will trust a service or not to trust a service. Makangoro (2014) argues that relative advantage and trust can have a positive correlation or negative correlation. It all depends on a user's willingness to believe in a service. But in most cases, there is always a positive correlation.

In making a decision to use mobile banking services, many users will often want to check on the cost of that service before making a decision. Also, in many cases, users will want to make time to search for the best possible information on the service before patronizing the service. Thus, the time users used to obtain information about a service is paramount to most users. The time used in accessing the information about a service influences the user's ability to trust the service provider. In the event of obtaining the information and something happens (for instance, network fails), it can affect the trust a user may have for the service provider.

### **2.2.3 Convenience and Trust**

Makangoro (2014) reports that Davies (1989) stated that the technology acceptance model was anchored on two major elements. These are the perceived ease of use and perceived usefulness. This is to say that a user's choice of a technology and in this case a mobile banking technology is dependent on the perceived ease with which the technology can be used and the usefulness of that technology to the user.

On the other hand, trust is hinged on three dimensions i. e. ability, integrity and benevolence. Convenience is linked to perceived ease of use (PEOU) and perceived usefulness (PU). Bhattacharjee (2002) has noted that ability is about a customer's perception of the service that is to be delivered. Integrity relates to the expectation of the user that a service that is delivered is fair and in a reasonable state while benevolence also called goodwill, connects with the



goodness of the service provider. Thus, a service provider has to prove that he or she has good intentions to provide quality or right services to the user or consumer

## **2.3 EMPIRICAL REVIEW**

### **2.3.1 Risks Associated with Mobile Banking**

Rahman (2018) studied the risks that are linked to payment banks and mobile related money platforms in India. The study depended on both primary and secondary data. Primary data was obtained through the use of questionnaires. Four Hundred and Fifty (450) questionnaires were administered to unbanked participants in only India. The geographical area in India was areas where there were no traditional banking systems and where residents depended on only mobile banking. The secondary data was obtained from published and unpublished journals, articles and information on the internet. Sources of these references were duly acknowledged. Data analysis was regression analysis. The research revealed "...that the risks associated with payment banks and mobile-based money platforms pose a minimal threat" Rahman (2018: 2). He, Tian, Shen and Li (nd, research-in-progress) studied mobile banking application's security risks using Blog Mining and Workflow Technology as research methods in China to provide banks and customers to avoid the security risks of using mobile banking technology. Since data is still relatively scarce in the field of mobile banking technology, the authors used first, blog as a mining research method where they discussed blog pages that analyzed or discuss issues of mobile banking technology threats. The authors specifically used a google search engine (<http://www.google.com/blogsearch>). About 200,000 results were retrieved from the search between 2012-2015 and the top 100 data sets related to the topic were selected for mining and text analysis. Second, the authors used the workflow technology to stimulate real-life scenarios within a laboratory setting to analysis mobile security attacks on mobile

banking. The workflow tools such as Kepler enabled the researchers to use interfaces that allow for the creation of various security scenarios.

From the blog mining and workflow analysis, the authors found out that security risks/threats related with mobile banking technology were malware which included Trojan, root kits and viruses. The authors found out that cyber criminals have been refining these malwares to target mobile banking devices to have access to bank accounts. Second the authors found out that unencrypted wireless networks that banks are using in delivering their services pose as a risk because if clients use unsecure networks to check their balances, deposit money or do other transactions, cyber criminals can easily hack these accounts make away with the clients' money. Finally, He, Tian, Shen and Li (nd) also found vulnerability of banking technology apps to pose as a risk to mobile banking technology. They noted that many banking technologies do not have any protective measure especially against reverse engineering of code. This makes it easy for cyber criminals to break into clients' accounts easily. The authors therefore, concluded that the blog mining and workflow research methods are best in identifying and mitigating mobile banking technology threats/risks.

### **2.3.2 Benefits Associated with Mobile Banking**

Rahman (2018) studied the risks and benefits associated with payment banks and mobile-based money platforms in India. The study depended on both primary and secondary data. Primary data was obtained through the use of questionnaires. A total of 450 questionnaires were administered to respondents who were unbanked in only India. The geographical area in India was areas where there were no traditional banking systems and where residents depended on only mobile banking. The secondary data was gathered through some published and unpublished journals, articles and information on the internet. Sources of these references were duly acknowledged. Data analysis was a regression analysis. Rahman (2018:15) concluded that "Mobile banking applications have and continue to hold the promise to

improve the standard of living for many in the developing world. By enabling access to a cashless payment infrastructure, these systems allow residents of such countries to reap the benefits of affordable banking.”

Rahmani, Tahvildari, Honarmand, Yousefi and Daghighi (2012) examined mobile banking and its benefits in Iran. The authors reviewed secondary data from eight articles, journals and other sources related to mobile banking in Iran. The study concluded that mobile banking technology has a number of benefits. These benefits included the ease with which transactions can be done because the technology can be used on smart phones. The authors also stated that mobile banking technology services can be done anywhere at any time because of the use of the Global Positioning System (GPS). Further, mobile banking technology according to the authors makes customers comfortable because they do not have to travel distances before they can have access to services.

### **2.3.3 The challenges Militating Mobile Banking**

Gaffar (2009) studied the prospects and challenges of mobile banking in Ghana. Questionnaires were the main tools for data collection. One Hundred customers: mainly students were chosen at random to respond to the questions on the questionnaire. The data analysis was in a descriptive multidimensional manner with the use of the Statistical Package for Social Sciences. Frequencies and percentages were computed for the questions in the questionnaire.

Gaffar's (2009: 4) study revealed that “Several factors including technical and security standards, regulatory and supervisory issues and business and legal issues were found to be the main factors that might hinder mobile banking implementation in Ghana.”

Tiwari, Agarwal and Goyal (2014) studied the imperative and challenges of mobile banking in India using a desktop literature review method. They noted that though mobile banking technology has several advantages such as ease of service and convenience, a number of



challenges are associated with the technology. They concluded that the challenges facing mobile banking include customer lack of knowledge and awareness of mobile banking technology, security issues and privacy, virus and malware attacks, risk in SMS mobile banking, operating on a wireless system creating ease of cybercriminal attack, and authentication issues.

#### **2.3.4 Strategies that will help Improve Mobile Banking**

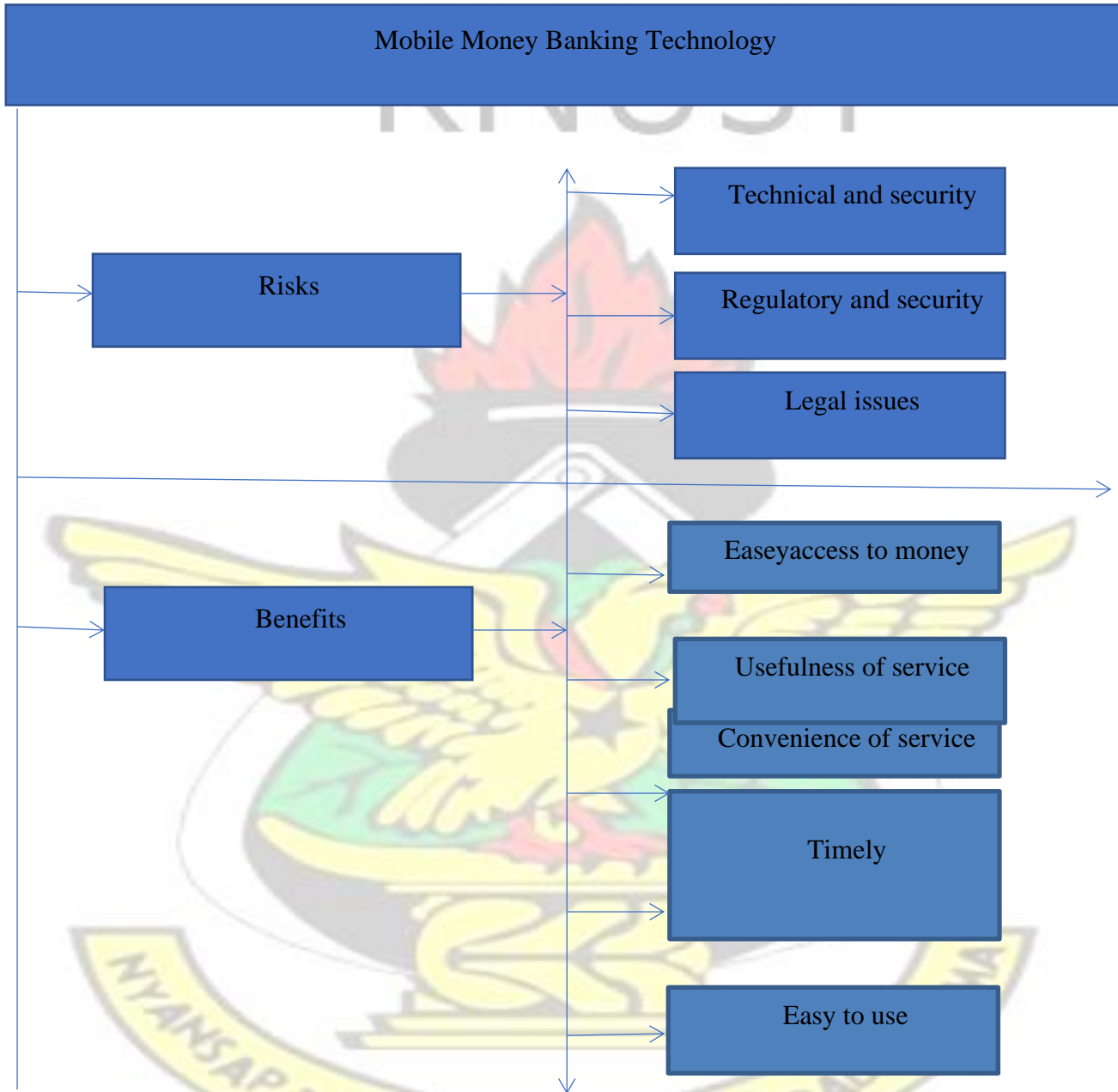
Gaffar (2009) studied the prospects and challenges of mobile banking in Ghana. Questionnaires were the main tools for data collection. A sample of 100 customers who were mainly students were chosen at random to respond to the questions on the questionnaire. The data analysis was in a descriptive multidimensional manner with the use of the Statistical Package for Social Sciences. Frequencies and percentages were computed for the questions in the questionnaire. Gaffar's (2009: 4) concluded that "Connectivity and secure communication platform and encrypted messaging system were found to be the factors that would enhance mobile banking implementation in Ghana."

Tiwari, Agarwal and Goyal (2014) studied the imperative and challenges of mobile banking in India using a desktop literature review method. They noted that there are some mitigation measures to curtail mobile banking technology risks and challenges by banks. They concluded that customer education and awareness of mobile banking technology services, addressing privacy issues, and creating trust among customers can address the risks and challenges associated with mobile banking technology.



## 2.4 CONCEPTUAL FRAMEWORK

Figure 2.1: Mobile Money Banking Technology



Source (Author's Construct, 2020)

**Figure 2.1 indicates that mobile money banking technology has both risks and benefits.**

The risks include technical and security standards, regulatory and security issues and legal issues. Despite these risks, mobile money banking technology has tremendous benefits to

users. These are easy access to money, safe savings, and convenience of the service, timely access, usefulness of service and the ease of the use of the service. The risks and benefits are but all part of mobile banking technology.

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## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.0 INTRODUCTION**

Chapter three describes the methodology used for the study. It started with the research design, population of the study, sample size and sampling techniques, data collection, data analysis, reliability and validity of the data collected, ethical considerations and profile of the study area.

#### **3.1 RESEARCH DESIGN**

This study employed a descriptive design. Descriptive design according to Millar (2003) allowed a researcher to describe the characteristics of a population or a phenomenon. This design is adopted for this study because it can be used in multiple ways and for various reasons (Millar, 2003). It depended on quantitative and qualitative data. The quantitative approach allowed the researcher to gather as much as possible data from the respondents using open and close-ended questions while the use of the qualitative research approach allowed the researcher to get an inner experience of participants and to determine how meaning could be formed through cultural analysis and to discover rather than test variables, depending largely on narratives, descriptions and explanations (Corban & Straus, 2008). The justification for the use of qualitative data is that it allowed the respondents to give detail answers to the questions posed rather than being restricted in their responses.

#### **3.2 POPULATION OF THE STUDY**

The research population comprised of GCB bank officials and customers using mobile banking services of GCB bank. The GCB bank in the Bolgatanga Municipality has a staff strength of 35 workers of which 23 are directly involved in operations. 12 are auxiliary staff such as cleaners, security and drivers. Thus, the study recruited all the 23 operations staff.

Also, the bank currently has about 1500 customers using the bank's mobile banking. Out of the 1500, only 52 customers will be contacted and recruited for this study in the Bolgatanga Municipality where the bank operates mobile banking services to clients or users of mobile banking services. In all, 75 respondents were selected. The respondents constituted both males and females. This gave equal opportunities for both males and females to give their responses to the questions posed in the questionnaire.

Also, there were four key informants for each of the two categories: customers and bank officials. Two each were male and female. Aside the key informants, there were two focus group discussions comprising of four members for each of the categories. So, in all, 95 respondents were recruited for the study. The reason for the low number of respondents was due to the COVID-19 pandemic which social protocols were adhere to. The researcher therefore due to the pandemic could not engaged as many respondents as possible to give their views on the issues that fall within the purview of this study in the Bolgatanga Municipality.

### **3.3 SAMPLE SIZE AND SAMPLING TECHNIQUE(S)**

Seventy-five (75) respondents were recruited to provide answers to the questionnaire. Eight key informants provided answers to some important questions that were drawn from the questionnaire while 15 respondents provided responses to the same questions posed to the key informants in a focus group discussion given a total of 98 respondents for the study.

A combination of probability and non-probability sampling techniques were used in this study. The probability sampling techniques gave equal opportunity to literate and non-literate users of mobile money banking while the non-probability sampling techniques allowed the researcher to select the study area and target respondents on purpose.

Probability sampling technique is where each individual/class, etc., in a given population is given an equal chance of being part of the research. Probability sampling were used to select



participants: banks officials and mobile money users randomly so that each would be given an equal chance of being part of the study.

According to Johnson and Josslyn (1995) and Creswell (1994) simple random sampling is where every individual in the population stands an equal chance of being selected. Seventy-Five questionnaires were conducted for bank officials and customers using mobile banking. These methods entail the selection of bank officials and customers among many others and so gave each respondent an equal chance: that is any respondent the researcher met who also met the criteria would be recruited for the study.

First, purposive sampling was used to select the Bolgatanga Municipality. And second, purposive sampling was also used to select the key informants, that is people the researcher thinks are knowledgeable in the study area who would provide in depth information. Table 1 shows the research tools, the category of respondents and the number of respondents per each research tool.

**Table 1: research tools, category of respondents and the number of respondents per each research tool.**

Category of respondents	Questionnaire	Male	Female	Total	KIIs	Male	Female	FGDs	Male	Female
	23	18	5	23	4	2	2	1		4
Mobile Bank Officials	52	33	10	52	4	2	2		4	4
<b>Total</b>	<b>75</b>	<b>51</b>	<b>24</b>	<b>75</b>	<b>8</b>	<b>4</b>	<b>4</b>		<b>4</b>	<b>8</b>

### **3.4 DATA COLLECTION**

Data was generated from primary sources. In the generation of primary data, mixed instruments for data collection were necessitated by the combined research method as discussed below.

#### **3.4.1 Questionnaire**

Seventy-Five (75) questionnaires comprised five Likert Scale survey questions and both open and closed ended questions designed by the researcher were administered to banks officials and mobile banking users by trained Research Assistants and the Researcher.

#### **3.4.2 Focus Group Discussions**

Adebo (2000) in his *Training Manual on Participatory Rural Appraisal* stated that focus group interviews/discussions are useful for obtaining general information about a community. FGDs are useful tool for cross checking information. Group interviews require very careful preparation. The ideal group, according to Adebo (2000), should comprise between eight and fifteen people.

For Dawson (2002), FGDs are major tool for understanding people's thoughts and feelings. It is usually conducted by inviting six to ten people to gather for a few hours with a trained moderator to talk about the issue under study. The meeting was held in a pleasant place, and refreshments are served to create a relaxed environment. The moderator needs objectivity and knowledge of the subject. The moderator started with a broad question before moving to more specific issues, encouraging open and easy discussion to bring out true feelings and thoughts. It was often held to help determine the accuracy of the information obtained in the

questionnaire interview. Comments were recorded through note taking or videotaping and studied later to understand the problem under study (Dawson, 2002).

This study set up one (1) Focus Group Discussions each for bank officials and mobile banking customers with GCB bank in the Bolgatanga Municipality given a total of two Focus Group Discussions. Each Focus Group Discussion involved eight (8) participants. All the participants were interviewed on the same questions that appeared on the questionnaire. This was necessary to ascertain reasons informing restricted responses on the questionnaire. These were recorded by writing.

### **3.4.3 Key Informant Interviews**

Chambers (1992) stipulates that key informant interviews involve enquiring who the experts are and seeking them out to obtain the desired information from them. In this study, four key informant interviews each were conducted for banks officials and mobile banking users. See Table 1 for details.

The data collection period took place between June, 2020 and July, 2020 from 8:00 am each day to 5:00 pm. Thus, the data collection period covered a period of one month. This was done by the researcher herself and three trained research assistants.

### **3.5 DATA ANALYSIS**

The researcher used Content Analysis. Content Analysis means analysis of the contents of an interview that allows you to be able to identify and categorize the main themes that emanated from the responses given by the participants (Dawson, 2002). The qualitative analysis took the form of descriptive narratives involving discussions on the data gathered from the Municipality. This entailed the coding of the data and drawing out of themes according to the research questions. The qualitative analysis was supported by quantitative analysis.

The quantitative was analysed through computer software. SPSS software was used to facilitate the generation of charts and figures. The software enabled the generation of the charts and figures while the author did descriptive explanations. The justification for this choice is founded on the fact that it ensures a vivid impression of the data using pictorial forms such as charts and graphs while at the same time gives the author the opportunity to explain the tables and figures generated.

### **3.6 VALIDITY OF THE INSTRUMENTS**

Though the records are reliable, there are often inconsistencies and inaccuracies, therefore there is a need also to examine the method by which the data were collected and try to ascertain the precision needed by the original (primary) user(Saunders *et al.*, 2009). To assess the validity of the documents, the research made a quick assessment of the source of the data and assessing the authority or reputation of the source. Since the 37 records reflects the original information as gathered from the primary sources, the data collection instruments can therefore be considered to have validity due to their nature.

### **3.7 RELIABILITY OF THE INSTRUMENTS**

Sekaran and Bougie (2010) defined reliability as an indication of the stability and consistency with which the instrument measures the concept and helps to assess the goodness of a measure. The confirmation of reliability of instruments is very crucial in that it is the only way to ensure that the information to be collected is going to be appropriate, correct and useful. To statistically test the reliability of the instruments the researcher carried out a pilot study using a test, pre-test technique. The questionnaire was initially tested on 50% of the respondents picked at random from a sample similar to the population under study and a repeat interview was done with the same respondents after one week. Since a correlation coefficient of 0.5 is normally considered a good measure of reliability after analysis the reliability test became



0.789 which is above the threshold of 0.7 according to cronbach alpha. Thus, the researcher went ahead to use the instrument.

### **3.8 ETHICAL CONSIDERATION**

The researcher adopted appropriate methodological procedures to avoid bias in the selection of samples and reporting the findings of the study. Thus, findings were also reported as they were, not as the researcher thinks they should be.

Additionally, the researcher took the pain to acquaint herself with adequate methodological procedures that ensured professionalism in the implementation of the research process. This ensured orderly and systematic execution of the study, and also accuracy and reliability of the findings. The reporting approach involved a frantic effort to ensure that they were correct; by this, the researcher made no attempt to change or slant primary information to suit her personal interest. The information from the field was presented in such a way that any direct or indirect possible adverse effects on the respondents were avoided.

An Informed Consent form was administered to the respondents seeking their consent and explained the rationale of the study and the confidentiality of the responses that they gave. Each respondent was assured that any information given would only be for the purpose of academic work and that their names would not be attached to the responses they gave.

### **3.9 ORGANIZATIONAL PROFILE**

The GCB bank is located in the centre of the Bolgatanga Municipality adjacent the Consolidated Bank of Ghana. The bank has a staff of 35 working within the bank. GCB bank initially offered only GCB mobile banking services to its customers. With this product, customers of the bank can transfer money from their accounts in the bank into their GCB mobile wallet.

Currently, GCB bank has introduced a new product called the G-Money. Customers who operate the G-Money could transfer money from their accounts in the bank into their G-Money account. With the G-Money account, a customer could also transfer money from his or her account to an account in another bank. The difference between the two services is that the first attracts double charges while the second attracts only one charge using the services. With the GCB mobile banking services, a customer could also buy air time or data using MTN, Vodafone and other networks.



## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND DISCUSSION

#### 4.0 INTRODUCTION

This chapter aims at presenting the demographic characteristics as well as results for this study. It starts with the demographic characteristics of the respondents, the risks associated with GCB bank mobile banking, the benefits associated with GCB bank mobile banking in the Bolgatanga Municipality, challenges to GCB bank mobile banking, and strategies to improve GCB mobile banking.

#### 4.1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

A total of 75 respondents were recruited for the study. This constituted 26 females representing 34% of the total number of participants. The male respondents were 49 representing 64% of the total respondents. Those who were bank officials were 10 constituting 13.3% while those who were customers using the GCB mobile banking technology were 65 representing 86.7%.

**Table 4.1 shows the sex and composition of the respondents of the questionnaire.**

**Table 4.1 shows the sex and composition of the respondents**

Sex	Frequency	Valid Percent	Customers of GCB bank	Valid percentage	Bank officials	Valid percentage
Female	26	34	20	30.8	4	40
Male	49	66	43	69.2	6	60
Total	75	100	65	100	10	100

**Source: Field Survey, 2020**

The table shows that there were more male respondents of 49 (66%) than female respondents who were only 26 (34%). Also, the GCB bank customers who use mobile banking technology were more than the bank officials. The customers were 65 representing 86.7%. Out of this, the females were 20 (30.8%) while the male were 43 (69.2%). For the bank officials, there were only 4 (40%) females while the males were 6 representing 60%. By implication, there were more male respondents of 49 (66%) than females of 26 (34%).

For the age distribution of the respondents, those who were between 20-30 years of age were 11 that is 15%. Those who were 31-40 years of age were 22 (30%), those who were 41-50 years of age were 34 (45%) while those who were above 50 years of age were 8 representing 10%. Table 4.2 indicates the age distribution of the respondents.

**Table 4.2: Age of the respondents**

<b>Ages</b>	<b>Frequency</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
20-30 years	11	15	15
31-40 years	22	30	45
41-50 years	34	45	90
Above 50 years	8	10	100
Total	75	100	

Source: Field Survey, 2020

The table indicates that those who were 41-50 years of age were majority of 34 (45%) followed by those who were 31-40 years of age, followed by those of 20-30 years of 11 (15%) while those who were above 50 years were the least of 8 (10). This implies that the age of the respondents that are economically active group of 41-50 years were more than those of the youthful age of 20-30 years who were 11 (15%) and those 31-40 years of 22 representing



30%. Thus, the table shows that the respondents who were in their active age (below 50 years) were the majority of 90%.

In terms of the level of education of the respondents, those had a Doctorate degree were 4 representing 5%. Those who had diploma were 21 (28%), those had master's degree were 16 (22%) while those who had a Bachelor's degree were 34 (45%). Table 4.3 shows the level of education of the respondents.

**Table 4.3: Level of education of the respondents**

<b>Education Level</b>	<b>Frequency</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
PhD	4	5	5
Diploma	21	28	33
Master's degree	16	22	55
Bachelor's degree	34	45	100
Total	75	100	

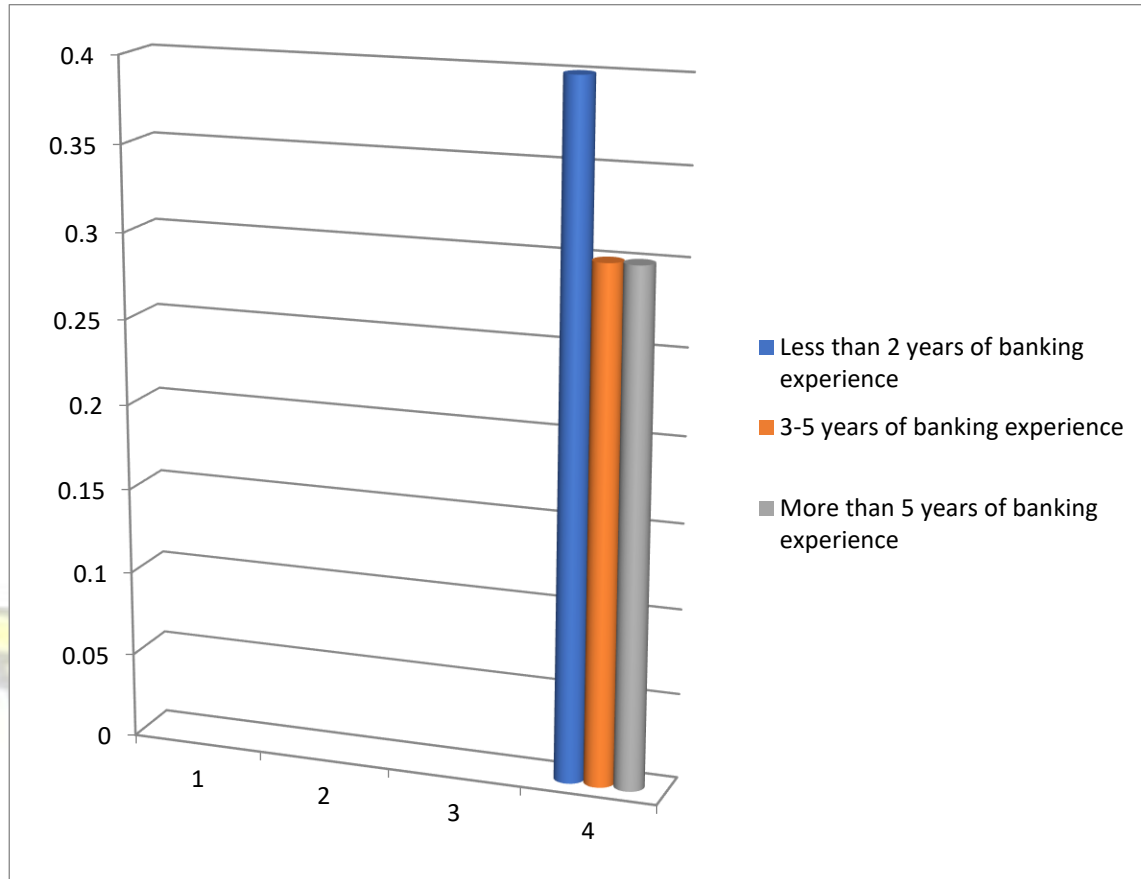
Source: Field Survey, 2020

The table shows that those who had a Bachelor's degree were more than the rest of 34 (45%) followed by those who had a diploma of 21 (28%), followed by those who had a master's degree while those who had a doctorate degree were the least of 4 (5%). This implies that the least qualification of the respondents was a diploma while the highest qualification was a doctorate degree.

With regards to the level of experience of the banking staff, those who had less than two years of banking experience were 4 (40%), followed by those who had 3-5 years and more than five

years of experience of 3 (30%) each. Figure 4.1 shows the banking experience of the banking staff.

**Figure 4.1: Banking experience of the banking staff.**



Source: Field Survey, 2020

The figure shows that majority of the respondents, 6 (60%) had three or more years of working with GCB bank. Only 4 (40%) had less than two years of banking experience in GCB banking. This implies that majority of the respondents have knowledge of the banking operations and services of the GCB bank including its mobile banking technology.

#### **4.2 The risks associated with GCB bank mobile banking**

From the blog mining and workflow analysis, Tian, Shen and Li (nd, research-in-progress) found out that security risks/threats related with mobile banking technology were malware which included Trojan, root kits and viruses. The authors found out that cyber criminals have

been refining these malwares to target mobile banking devices to have access to bank accounts. Second the authors found out that unencrypted wireless networks that banks are using in delivering their services pose as a risk because if clients use unsecure networks to check their balances, deposit money or do other transactions, cyber criminals can easily hack these accounts and take away with the clients' money.

The respondents gave their views about the risks associated with the GCB mobile banking technology similar to Tian, Shen and Li (nd, research-in-progress). About 42 (56%) of the respondents strongly agreed that backdoors that allowed secret entry points into the mobile banking programs without normal security check, 20 (27%) agreed, 4 (5.3%) were neutral, 20 (27%) disagreed while 14 (18.7%) strongly disagreed. This implies that majority of the respondents 62 (82.7%) agreed and strongly agree that backdoor spaces allowed secret entry points into the mobile banking system without security checks while 34 (45.3%) either disagreed or strongly disagreed. This shows that secret entry points of the GCB mobile banking system in the Bolgatanga Municipality pose as a risk to the mobile banking technology of the bank.

Also, 28 (37%) strongly agreed that programmers break into the system to transfer customer funds, 43 (57.3%) agreed, 2 (2.7%) were neutral, 13 (17.3%) disagreed while 14 (18.7%) strongly disagreed. This implies that 71 (94.7%) of the respondents either strongly agreed or agree while only 27 (36%) either agreed or strongly agreed. This shows that cyber programmers break into the mobile money banking system of the GCB in the Bolgatanga Municipality to transfer customers' funds.

About 32 (42.7%) of the respondents strongly agreed that unauthorized persons gain access to mobile banking systems when the users leave their phones logged on, 34 (45.3%) agreed, 2 (2.7%) were neutral, 17 (22.7%) disagreed while those who strongly disagreed were 15 (20%). By implication majority of the respondents, 66 (88%) of the respondents are of the

opinion that unauthorized persons gain access to GCB mobile banking systems and who users are logged on to make away with money.

Similar to the above, in a Key Informant Interview with a bank official, she mentioned that:

*The major risks of our mobile money banking system is hackers or cyber criminals trying to break into our system to steal clients' money. Also, sometimes our ATMs breakdown and it takes us long time to work on them. When this happens, criminals take advantage to temper with our systems.*

Table 4.4 indicates the risks that are associated with GCB mobile banking technology.

**Table 4.4: Risks that are associated with GCB mobile banking technology**

<b>Variables</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>
Backdoor that allows secret entry points into the mobile banking programs without normal security check	42	20	4	20	14
Programmers break into the system to transfer customer funds	28	43	2	13	14
Unauthorized persons gain access to mobile banking systems when users leave their phones logged on	32	34	2	17	15

Source: Field Survey, 2020



#### **4.3 The benefits associated with GCB bank mobile banking in the Bolgatanga**

##### **Municipality**

In Focus Group Discussion with customers of the GCB bank in the Bolgatanga Municipality, they mentioned that:

*Easy access to money without having to travel far, reduction in the carrying of large sums of money which can be lost to armed robbers and financial inclusion that is everyone having access to money anytime at anywhere* as the benefits of mobile banking.

The respondents gave their opinions of the benefits that are associated with GCB mobile banking. About 29 (38.7%) strongly agreed that GCB mobile banking creates convenience, 43 (57.3%) agreed, 3 (4%) were neutral, 17 (22.7%) disagreed while 8 (10.7%) strongly disagreed. This indicates that majority of the respondents 72 (81.7%) either strongly agreed or agreed that GCB mobile banking creates convenience while only 25 (33.3%) either strongly disagreed or agreed. This implies that GCB mobile banking creates convenience for customers.

In terms of accessibility, 31 respondents strongly agreed that GCB mobile banking allows for easy access to funds, 32 (42.7%) agreed, 3 (4%) were neutral, 20 (26.7%) disagreed while 14 (18.7%) strongly agreed. This shows that 66 (88%) of the respondents either agreed or strongly agreed that GCB mobile banking promotes easy accessibility while 34 (45.3%) either agreed or strongly disagreed or disagreed. This implies that GCB mobile banking promotes accessibility to funds.

Also, the respondents indicated their views on reducing of carrying of cash through GCB banking technology. About 27 (36%) of the respondents strongly agreed that GCB mobile banking technology reduces the carrying of cash, 40 (53.3%) agreed, 11 (14.7%) were neutral, 10 (13.3%) agreed while 12 (16%) strongly disagreed. By implication, 67 (89.3%) either

agreed or strongly agreed that GCB mobile banking reduces the carrying of cash while 22 (29.3%) either disagreed or strongly disagreed. This shows that GCB mobile banking reduces the carrying of cash because majority of the respondents stated so.

In terms of the promotion of financial inclusion, 17 (22.7%) of the respondents strongly agreed, 50 (66.7%) agreed, 5 (6.7%) were neutral, 14 (18.7%) disagreed while 14 (18.7%) strongly agreed. This indicates that 67 (89.3%) of the respondents either agreed or strongly agreed while 28 (37.3%) of the respondents disagreed or strongly disagreed, this shows that GCB mobile banking promoted financial inclusion because majority if the respondents agreed or strongly agreed.

Rahman (2018) concluded in his study that mobile banking applications have and will continue to hold the promise to improve the standard of living for many in the developing world. By enabling access to a cashless payment infrastructure, these systems allow residents of such countries to reap the benefits of affordable banking.

The respondents gave their opinions whether GCB mobile banking reduces rural-urban divide. About 23 (30.7%) strongly agreed that it reduces rural-urban divide, 43 (57.3%) agreed, none were neutral, 18 (24%) disagreed while 16 (21.3%) strongly disagreed. This indicates that 65 (86.7%) of the respondents either agreed or strongly agreed while 32 (42.7%) either disagreed or strongly disagreed. By implication, GCB mobile banking reduces rural-urban divide because majority of the respondents 86.7% responded positively.

Lastly, the respondents indicated whether GCB mobile banking reduced inequality and poverty. About 24 (32%) strongly agreed, 42 (56%) agreed, 6 (8%) were neutral, 17 (22.7%) disagreed while 16 (21.3%) strongly agreed. This shows that 66 (88%) of the respondents accepted that the GCB mobile banking reduces inequality and poverty while only 28 (37.3%) disagreed or strongly disagreed. This indicates that GCB mobile banking reduces inequality and poverty. These findings are in line with the findings of Pankomera and Van Greunen.

(2018). The researchers categorized the benefits of mobile banking technology into five similar to this study. These are convenience and accessibility, reduced carrying of cash, promotion of financial inclusion, reduced urban-rural divide and reduced inequality and poverty. Table 4.5 indicates the benefits of GCB mobile banking.

**Table 4.5: The benefits of GCB mobile banking**

Variables	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Convenience	29	43	3	17	8
Accessibility	31	32	3	20	14
Reduced carrying of cash	27	40	11	10	12
Promotion of financial inclusion	17	50	5	14	14
Reduce urban-rural divide	23	43	0	18	16
Reduced inequality and poverty	24	42	6	17	11

Source: Field Survey, 2020

#### **4.4 Challenges to GCB bank mobile banking**

Bamoriya (2016) found some challenges facing mobile banking technologies. These challenges include security issues. According to him, many customers have the perception that their accounts are not safe and are prone to cyber criminals. The respondents mentioned the challenges that face GCB mobile banking. These challenges were categorized into security, economic, social and network factors. They are discussed below.



#### 4. 4.1 Security factors

According Santhosh and Babu (2019), mobile banking technology relates to the issues that making mobile banking difficult for both customers and banks. They mentioned a number of challenges facing mobile banking technologies. The authors mentioned questionable security as a challenge to mobile banking. They noted that about 90% of all mobile banking technologies have security challenges.

The respondents indicated their views on the security factors that pose as challenges to GCB mobile banking. About 20 (26.7%) strongly agreed that third party intrusion is a challenge, 40 (53.3%) agree, 6 (8%) were neutral, 22 (29.3%) disagreed while 12 (16%) strongly disagreed. By this it is clear that 60 (80%) of the respondents either agreed or strongly agreed that third party intrusion is a challenge while only 34 (20%) disagreed or strongly disagreed. This implies that third party intrusion is a challenge to GCB mobile banking.

Hacking is another challenge mentioned. About 23 (30.7%) of the respondents strongly agreed, 47 (62.7%) agreed, 5 (6.7%) were neutral, 14 (18.7%) disagreed while 11 (14.7%) strongly disagreed. This shows that 70 (93.3%) of the respondents either strongly agreed or agreed while 25 (33.3%) either disagreed or strongly disagreed. This indicates from the responses that hacking is a challenge to mobile banking in GCB. This in line with the findings of Antwi (2015). Antwi (2015) opined that since the novel mobile banking industry took the centre stage of financial transactions, increasingly, there have arisen some security threats in the industry such as hackers and fraudsters making away with peoples' money. Thus, most mobile banking technologies have adopted security and privacy features. This indicates that mobile banking technologies are not insulated from risk cases of theft, fraud and scamming.

In terms of loss of privacy, about 37 (49.3%) of the respondents strongly agreed, 38 (50.7%) agreed, 0 (0%) were neutral, 0 (0%) disagreed while (0%) strongly disagreed. This implies



that all the respondents, 75 (100%) agreed or disagreed that loss of privacy is a challenge to GCB mobile banking.

#### **4.4.2 Economic factors**

In terms of the economic factors, the respondents indicated their responses. About 23 (30.7%) of the respondents strongly agreed that cost of the mobile banking, 52 (44.3%) agreed, 0 (0%) were neutral, (0%) disagreed while 0 (0%) strongly disagreed. By implication, all the respondents, 75 (100%) either agreed or strongly agreed that the cost of GCB mobile banking technology possess as a challenge to customer usage of the services.

#### **4.4.3 Social Factors**

About 25 (33.3%) of the respondents strongly agreed that customer trust for GCB mobile banking is a challenge, 30 (40%) agreed, 0 (0%) were neutral, 5 (6.7%) disagreed while 20 (26.7%) strongly disagreed. This means that 55 (73.3%) strongly agreed and agreed that customer trust is a challenge to GCB mobile banking while 25 (33.3%) disagreed or strongly disagreed. This shows that customer trust is a challenge to GCB mobile banking. In an interview with a customer Key Informant, he stated that:

*One of my major concerns and I think the concerns of the numerous customers of this bank about their mobile banking system has been trust. Sometimes, I do not trust their systems as there are frequent network issues here and there. It is really something this bank has to look into: customer trust.*

Again, the respondents gain their views on awareness as a challenge in GCB mobile banking. About 20 (26.7%) respondents strongly agreed, 25 (33.3%) agreed, 5 (5.7%) were neutral, 20 (26.7%) disagreed while 5 (5.7%) strongly disagreed. This showcases that 55 (73.3%) agreed and strongly agreed that customer low awareness is a challenge to GCB mobile banking while 25 (33.3%) disagreed and strongly disagreed. This indicates customers' lack of awareness of GCB mobile banking is a challenge.

#### 4.4.4 Network factors

In terms of network coverage as a challenge, about 30 (40%) of the respondents strongly agreed, 40 (53.3%) agreed, 0 (0%) were neutral, 5 (5.7%) disagree while 0 (0%) strongly disagreed. This shows that 70 (93.3%) of the respondents agreed or strongly agreed that network of the GCB mobile banking is a challenge. This implies that poor mobile banking network of GCB mobile banking poses as a challenge. Table 4.6 indicates the challenges of GCB mobile banking technology.

**Table 4.6: Challenges of GCB mobile banking technology**

Variables	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<b>Security</b>					
Third party intrusion	20	40	6	22	12
Hacking	23	47	5	14	11
Loss of privacy	37	38	8	10	17
<b>Economic factors</b>					
Cost of service	23	42	10	13	12
<b>Social factors</b>					
Customers trust	25	30	0	5	20
Awareness	20	25	5	20	5
<b>Network</b>					
Network coverage	30	40	5	0	0

**Source: Field Survey, 2020**

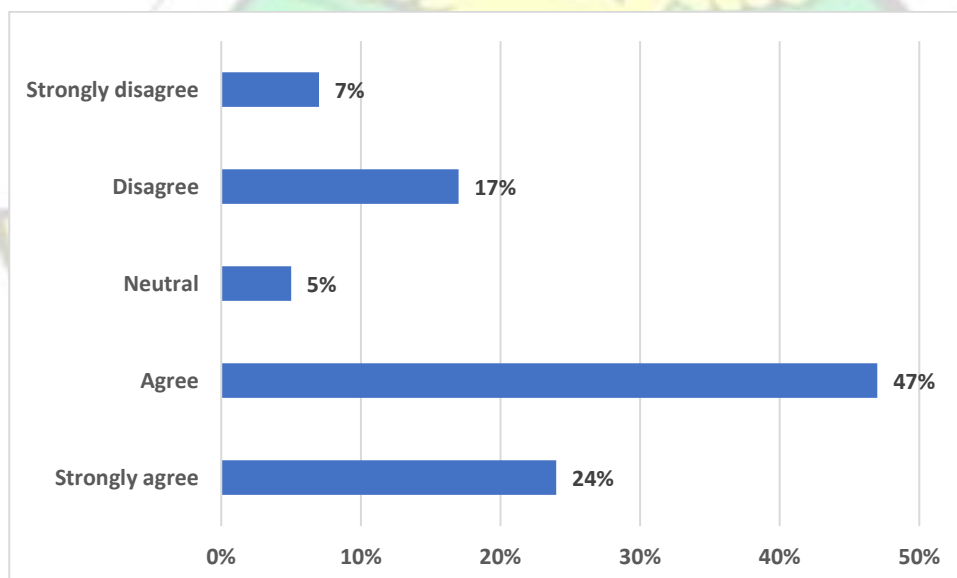
#### 4.5 Strategies to improve GCB mobile banking

The respondents indicated two strategies that can improve GCB mobile banking similar to Gaffar's (2009) study in Ghana. Gaffar (2009) concluded in his study that connectivity and secure communication platform and encrypted messaging system are found to be the factors that would enhance mobile banking implementation in Ghana. This study also found encryption and isolation as the strategies that would improve GCB mobile banking. These two strategies are as discussed in the following sections.

##### 4.5.1 Perception on the Use of data encryption sensitive data as a strategy to improve GCB mobile banking

The study sought to determine the level of use of encryption employed by commercial banks and responses shows that majority of the respondents totaling 71 % agreed that there is use of data encryption to achieve a high level of security, 5% of the respondents were neutral, 17% and 7% disagreed and strongly disagreed respectively.

**Figure 4.2: Use of data encryption sensitive data as a strategy to improve GCB mobile banking**

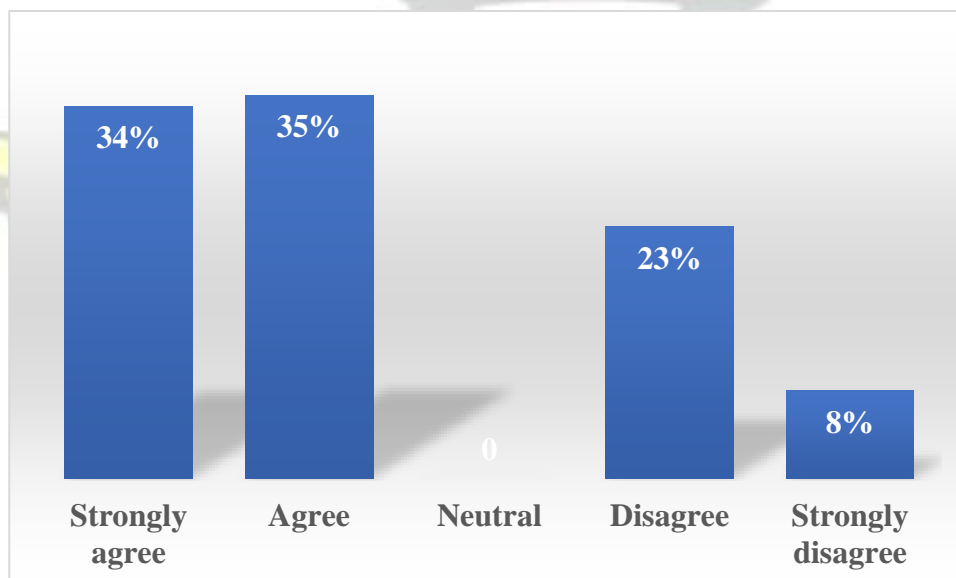


Source: Field Survey, 2020

#### 4.5.2 Respondents' perception on the Use of data encryption to achieve a high level of security as a strategy to improve GCB mobile banking

According to the analysis in figure 4.2 a total of 69 % of respondents have agreed that there is use of data encryption to achieve a high level of security to improve GCB mobile banking, whilst 23% and 8% disagreed and strongly disagreed respectively. They stated use of data encryption to avoid misuse of data. This shows that banks are able to block internet access and prevent sending out confidential information and restrict access of data by unauthorized users.

**Figure 4.3: Use of data encryption to achieve a high level of security as a strategy to improve GCB mobile banking**



**Source: Field Survey, 2020**

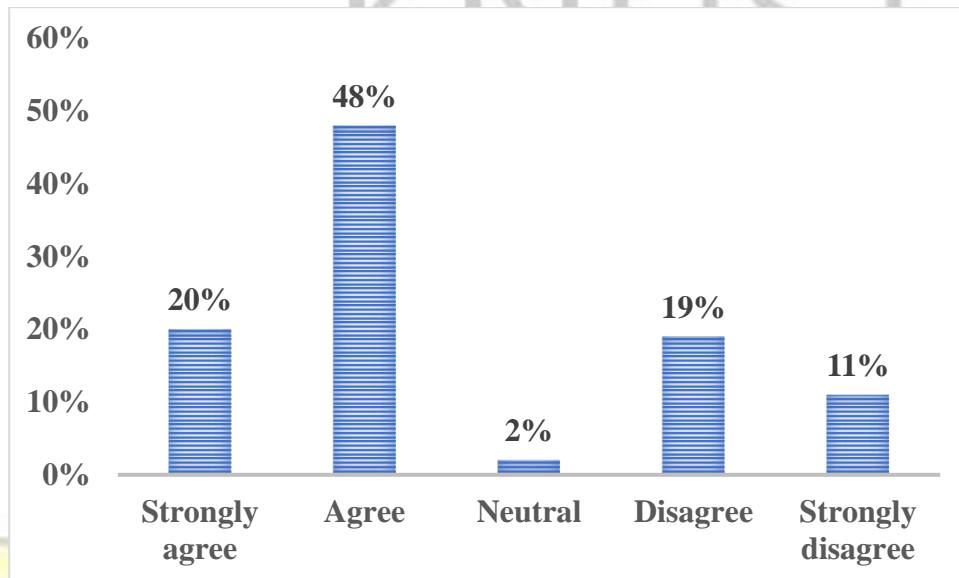
#### 4.5.3 Respondents Perception on the Use of bank's issued mobile phone handsets to enhance security as a strategy to improve GCB mobile banking

The study sought to determine the use of bank's issued mobile phone handsets to enhance security as a strategy to improve GCB mobile banking, analysis from figure..... revealed that, a total of 68% of the respondents agreed, 2% respondents were neutral whilst 19% and 11% disagreed and strongly disagreed respectively. This indicate that majority of the



respondents agreed that the use of bank's issued mobile phone handsets can enhance security as a strategy to improve GCB mobile banking achieve objectives.

**Figure 4.4: Use of bank's issued mobile phone handsets to enhance security as a strategy to improve GCB mobile banking**



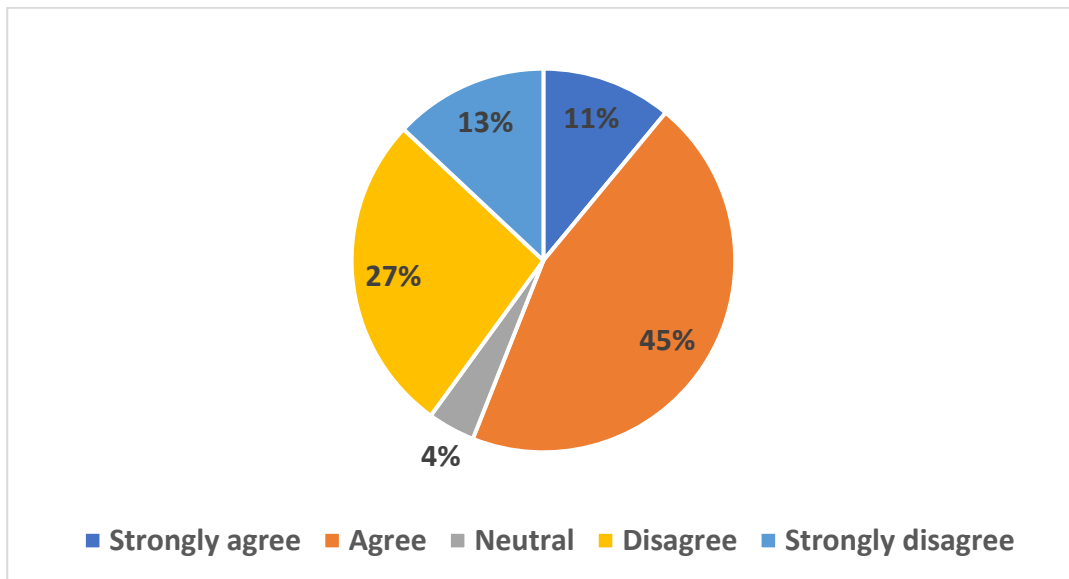
**Source: Field Survey, 2020**

#### **4.5.4 Respondents Perception on the Use of banks issued SIM CARDS to enhance security as a strategy to improve GCB mobile banking**

Figure 4.5 represent the general view of the use of banks issued SIM CARDS to enhance security as a strategy to improve GCB mobile banking. Majority of respondents i.e. 45(56%) agreed to the fact that use of banks issued SIM CARDS to enhance security as a strategy to improve GCB mobile banking is possible.

3 (4%) were neutral, 20 (27%) stronglyy disagreed and 10 (13%)Disagreed.

**Figure 4.5: Use of banks issued SIM CARDS to enhance security as a strategy to improve GCB mobile banking**



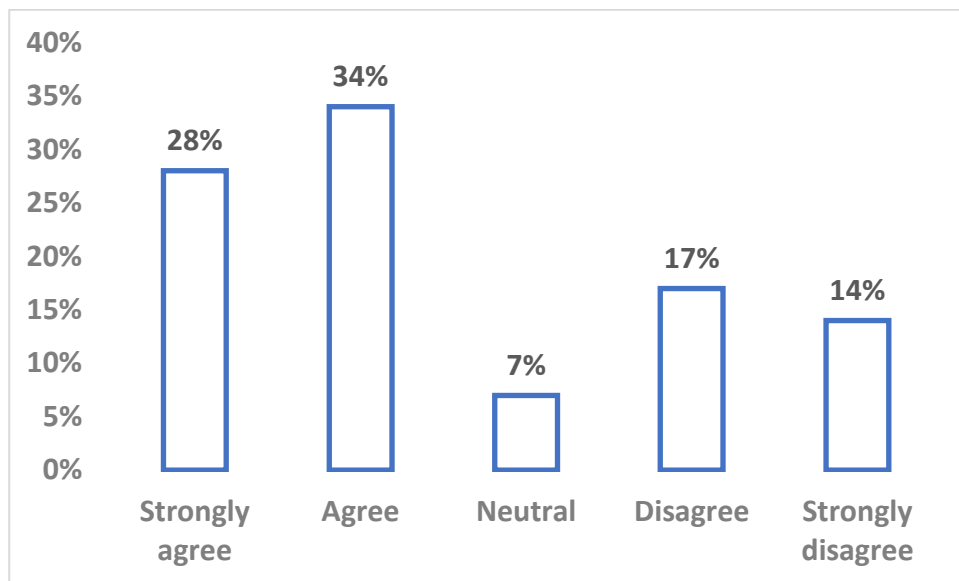
Source: Field Survey, 2020

#### 4.5.5 Respondents Perception on the

Use of firewall to block network access

Figure 4.6 describe the use of firewall to block network access 21 (28%) respondents strongly agreed, there is high use of firewall to block network access to unauthorized users 26(34%) agreed, 5 (7%) were neutral, 12(17%) strongly disagreed and 10 (14%)Disagreed.

**Figure 4.6: Use of firewall to block network access**



Source: Field Survey, 2020



## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.0 INTRODUCTION

This chapter in tends to summarize, conclude and make some recommendations for the enhancement of GCB mobile banking. It starts with the summary of major findings, conclusion and ends with some recommendations.

#### 5.1 SUMMARY

This section presents the key findings as below

##### **5.1.1 The risks that are associated with mobile banking technology in GCB bank in Bolgatanga.**

The respondents indicated that there are some risks that are associated with GCB mobile banking in the Bolgatanga Municipality. These risks are backdoor that allows secret entry points into the mobile banking programs without normal security check. Majority of the respondents, 62 (82.7%) either agreed or strongly agreed that backdoor spaces allowed secret entry points into the mobile banking system without security checks. Also, programmers break into the mobile banking system to transfer customer funds. Most of the respondents, that is 71 (94.7%) of them either strongly agreed or agree to this assertion. The last risk associated with GCB mobile banking is unauthorized persons gaining access to the mobile banking systems of the bank when users leave their phones logged on. An overwhelming majority of the respondents, 66 (88%) either agreed or strongly agreed that unauthorized persons gain access to GCB mobile banking systems and who users are logged on to make away with money.

##### **5.1.2 The benefits associated with GCB bank mobile banking technology in Bolgatanga.**

There are some benefits that are associated with GCB mobile banking. These benefits include convenience of the banking system. Majority of the respondents, 72 (81.7%) either strongly



agreed or agreed that GCB mobile banking creates convenience for users of the services. That apart, the mobile banking system creates easy accessibility for users. Most of the respondents, 66 (88%) of the respondents either agreed or strongly agreed that GCB mobile banking promotes easy accessibility. Other benefits of the mobile banking system of the bank includes it reduces carrying of cash. About 67 (89.3%) of the respondents either agreed or strongly agreed that GCB mobile banking reduces the carrying of cash. Also, the GCB mobile banking system promotes financial inclusion. Majority of the respondents, 67 (89.3%) either agreed or strongly agreed to this assertion. Furthermore, GCB mobile banking reduces the rural-urban divide of communities. Majority of the respondents, 65 (86.7%) either agreed or strongly agreed that GCB mobile banking reduces the rural-urban divide. The system also reduces inequality and poverty.

### **5.1.3 The challenges militating GCB bank mobile banking in the Bolgatanga Municipality.**

There are some challenges to GCB mobile banking. These challenges are categorized into security, economic, social and network factors. These challenges are as below.

The security challenges include third party intrusion. Majority of the respondents, 60 (80%) either agreed or strongly agreed that third party intrusion is a challenge. More so, hacking is a challenge. About 70 (93.3%) of the respondents either strongly agreed or agreed that hacking poses a challenge to GCB mobile banking. In addition to that loss of privacy also forms part of the GCB mobile banking challenges. Majority of the respondents, 75 (100%) agreed or disagreed that loss of privacy is a challenge.

Economically, cost of the mobile banking operations is a challenge. All the respondents, 75 (100%) either agreed or strongly agreed that the cost of GCB mobile banking technology possess as a challenge to customer usage of the services.

In terms of the social challenges, customer trust for GCB mobile banking is a challenge. Majority of the respondents, 55 (73.3%) strongly agreed and agreed that customer trust is a challenge to GCB mobile banking. Apart from customer trust, low awareness is also a challenge in GCB mobile banking. An overwhelming majority, 55 (73.3%) agreed and strongly agreed that customer low awareness is a challenge to GCB mobile banking.

Lastly, poor network system also poses as a challenge to the GCB mobile banking system. Many of the respondents, 70 (93.3%) of the respondents agreed or strongly agreed that the network system of the GCB mobile banking is a big challenge.

#### **5.1.4 The Strategies that will help improve GCB bank mobile banking technology in Bolgatanga.**

In terms of improving the GCB mobile banking system, two strategies are needed. These are encryption and isolation. There is the need to use data encryption sensitive data to provide a high level of security. An overwhelming majority, 71 (94.7%), either agreed or strongly agreed that there is need for the use of data encryption sensitive data in the operation of GCB mobile banking to provide secured security.

There is also need for the use of the bank's issued mobile phone handsets to enhance security, use of banks issued SIM CARDS and the use of firewall to block network access to the mobile banking system. About majority, 55 (73.3%) of the respondents are of the opinion that to improve the GCB mobile banking services, there is need for the use of the bank's issued mobile phone handsets to enhance security, use of banks issued SIM CARDS and the use of firewall to block network access.

## **5.2 CONCLUSION**

In conclusion, GCB mobile banking is associated with some risks in the Bolgatanga Municipality. Notably among them are: the existence of a backdoor that allows secret entry

points into the mobile banking programs without normal security check, programmers break into the mobile banking system to transfer customer funds and unauthorized persons gaining access to the mobile banking systems of the bank when users leave their phones logged on. But be that as it may, GCB mobile banking in the Bolgatanga Municipality has some benefits. These are convenience of the banking system; the mobile banking system creates easy accessibility for users. GCB mobile banking reduces the rural-urban divide of communities. The challenges associated with GCB mobile banking are prominent among them are: security, economic, social and network challenges. GCB can improve their mobile banking system by adopting two strategies: encryption and isolation.

### **5.3 RECOMMENDATIONS**

The study found that there are some challenges militating against GCB mobile banking in the Bolgatanga Municipality. Therefore, some recommendations are made to improve the mobile banking services in the bank.

The study recommends that the security challenges such as third-party intrusion, hacking, loss of privacy, should be addressed by the bank by employing more competent and expert staff that can encrypt and create awareness among users of the mobile banking system to constantly log off their accounts when not in use.

Additionally, the economic challenge, cost of the GCB mobile money banking services should be waived by the bank. This will enable as many as possible customers to enroll on the service to enjoy easy banking and to increase the number of customers patronizing the bank in Ghana and particularly in the Upper East Region.

The study also revealed that customer lack of trust for the GCB mobile banking system has made it difficult to embrace the technology. This study thus recommends that GCB and other banks should build trust and confidence among their customers so as to make them use their

mobile banking systems. This can be done through awareness creation among the general public about their mobile banking services and how secure customers can be using such technologies.

Finally, the study identified that poor network of the GCB mobile banking system poses as a challenge making it difficult for customers to have reliable services anytime they so desire.

This study recommends that GCB banking should purchase the latest technological devices that provide reliable network to customers.

#### **5.4 RECOMMENDATION FOR FURTHER STUDIES**

- The study recommends further research on a larger sample of banks in order to determine the extent of the applications of e-banking.
- Furthermore, there should be studies on a sample of customers in order to determine the extent of acceptance of electronic banking.



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## Section B: The risks associated with GCB bank mobile banking

6. What are the risks associated with GCB mobile banking?

6. The questionnaire is prepared in Likert-Scale form with five (5) point scale. Rank the following risks associated with GCB bank mobile banking (5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree)

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Backdoor attacks that allow secret entry points into the mobile banking programs without normal security check					
Programmers who break into the system to transfer customer funds					
Unauthorized persons gaining access to mobile banking systems when the users carelessly leave their phones logged on					

Criminal deception by customers for financial gain					
Criminal deception by agents for financial gain					
Criminal deception by business partners for financial gain					
Criminal deception by system administrators for financial gain					

### **Section C: The benefits associated with GCB bank mobile banking in the Bolgatanga**

#### **Municipality**

8. What are the benefits associated with GCB mobile banking?

### **Section C: The benefits associated with GCB bank mobile banking in the Bolgatanga**

#### **Municipality**

The questionnaire is prepared in Likert-Scale form with five (5) point scale. Rank the following benefits associated with GCB bank mobile banking (5= Strongly Agree, 4= Agree,

3= Neutral,

2= Disagree, 1= Strongly Disagree)

<b>Item</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>
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Convenience

Accessibility

Reduced carrying of

cash

Promotion of financial

inclusion

Reduce urban-rural

divide

Reduced inequality and

poverty

#### **Section D: Challenges to GCB bank mobile banking**

10. Which of the following do you consider as challenges related to GCB bank mobile banking?

8. The questionnaire is prepared in Likert-Scale form with five (5) point scale. Rank the following challenges related to GCB bank mobile banking (5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree)

<b>Item</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>
<b>Security</b>					
Third party intrusion					
Hacking					
Loss of privacy					
<b>Economic factors</b>					
Cost of service					

<b>Social factors</b>					
Customers trust					
Awareness					
<b>Infrastructure</b>					
Network coverage					

#### Section E: Strategies to improve GCB mobile banking

12. Which of these strategies can help improve GCB bank mobile banking? Tick as appropriate

9. The questionnaire is prepared in Likert-Scale form with five (5) point scale. Rank the following strategies which will help improve GCB bank mobile banking (5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree)

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>Two factor authentications</b>					
Use of card readers codes together with the normal PIN					
<b>Encryption</b>					
Use of data encryption sensitive data					



Use of data encryption to achieve a high level of security					
<b>Isolation</b>					
Use of bank's issued mobile phone handsets to enhance security					
Use of banks issued SIM CARDS to enhance security					
Use of firewall to block network access					

13. What other ways can help improve GCB bank mobile banking?

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**Thank you for your attention.**

## **APPENDIX II**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**ASSESSING THE RISK AND BENEFITS ASSOCIATED WITH MOBILE**

**BANKING TECHNOLOGY IN GHANA. A CASE STUDY OF GCB BANK IN THE**

**BOLGATANGA MUNICIPALITY OF THE UPPER EAST REGION**

**FGDs FOR BANK OFFICIALS AND MOBILE BANKING CUSTOMERS OF GCB**

**BANK IN BOLGATANGA MUNICIPALITY**

These questions seek to obtain information on the risks and benefits of mobile banking technology of GCB bank in the Bolgatanga Municipality of the Upper East Region of Ghana.

The study is purely for academic purposes. You are therefore, required to answer the questions below as honestly as possible. Your response will be treated as confidential.

1. Do you see any risks associated with GCB bank mobile banking?
2. Are there any benefits associated with GCB bank mobile banking?
3. Are there challenges related to GCB bank mobile banking?
4. Are there strategies that can help improve GCB bank mobile banking?

### APPENDIX III

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI  
ASSESSING THE RISK AND BENEFITS ASSOCIATED WITH MOBILE  
BANKING TECHNOLOGY IN GHANA. A CASE STUDY OF GCB BANK IN THE  
BOLGATANGA MUNICIPALITY OF THE UPPER EAST REGION  
KII's FOR BANK OFFICIALS AND MOBILE BANKING CUSTOMERS OF GCB  
BANK IN BOLGATANGA MUNICIPALITY**

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The study is purely for academic purposes. You are therefore, required to answer the questions below as honestly as possible. Your response will be treated as confidential.

1. Do you see any risks associated with GCB bank mobile banking?
2. Are there any benefits associated with GCB bank mobile banking?
3. Are there challenges related to GCB bank mobile banking?
4. Are there strategies that can help improve GCB bank mobile banking?