



UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATAL

**Effectiveness of credit risk management practices of Ghanaian
commercial banks in agricultural finance**

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DECLARATION

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DEDICATION

This thesis is dedicated to my mother, Theresa Amaan Guun (the woman who sold all her clothes and cooking utensils to make sure I am educated); my wife, Dora; and my children, Ruby Gumah, and Trinity Deso Nyebar. It is also dedicated posthumously to my father, the man who never enjoyed the fruits of his labour.

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ABSTRACT

Lending to the agricultural sector by commercial banks in Ghana is characterised by high credit risk even though empirical evidence suggests that commercial banks can minimize this exposure by using appropriate practices to mitigate against adverse effects. This implies that the credit risk management practices adopted by Ghanaian commercial banks may be inadequate and ineffective due to credit risk identification challenges or problems in implementing credit risk management policies. The study investigated the methods adopted by commercial banks to identify credit risk, the effectiveness of the implementation of credit risk management policies, and the strategies used by Ghanaian commercial banks to mitigate credit risk in agricultural finance. The mixed methods approach, involving the use of quantitative method using survey questionnaire and qualitative method through interviews and policy documents, was adopted. Data were analysed using Principal Components Analysis (PCA), ANOVA and MANOVA, documents, and thematic analysis. Findings indicated that some of the methods used by commercial banks to identify credit risk in agricultural finance do not meet commercial banks' credit risk management needs. Also, some other methods that proved effective in minimising credit risk were not frequently used by commercial banks. Also, most Ghanaian commercial banks lacked technical units and technical employees with agricultural training backgrounds to manage the credit related to agricultural finance. Further, agricultural activities lacked insurance schemes to protect against credit risk. The ANOVA and MANOVA tests showed significant differences in credit risk management practices among Ghanaian commercial banks. The study recommended the need for a robust credit risk management strategies to mitigate credit risk in agricultural finance. The agricultural sector should be supported with refined policy and implementation documents informed by the reality of borrowers' inability to honour loan contracts. The findings point to the needs to increase credit guarantee schemes and create incentive-based risk-sharing systems for small and medium agriculture enterprises; and establish more robust credit referencing bureau institutions to reduce credit risk.

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LIST OF ABBREVIATIONS

ADB	Agricultural Development Bank
ADF	Agence Française de Développement
ANOVA	Analysis of Variance
BoE	Bank of England
BoG	Bank of Ghana
CAPM	Capital Assets Pricing Model
CAR	Capital Adequacy Ratio
CFA	Confirmatory Factor Analysis
CPV	Credit Portfolio View
CR	Credit Risk
CRB	Credit Referencing Bureau
CRM	Credit Risk Management
DANIDA	Danish International Development Agency
EFA	Exploratory Factor Analysis
GCB	Ghana Commercial Bank
GDP	Gross Domestic Product
GEB	Ghana Exim Bank
GIRSAL Lending	Ghana Incentive-Based Risk Sharing System for Agricultural
GoG	Government of Ghana
GPIR	Ghana Poverty and Inequality Report

GSGDA	Ghana Shared Growth and Development Agenda
GSS	Ghana Statistical Service
IFC	International Finance Corporation
IMF	International Monetary Fund
KMO	Kaiser-Meyer-Olkin
KYC	Know Your Customer
MPT	Modern Portfolio Theory
MANOVA	Multivariate Analysis of Variance
NGO	Non-Governmental Organisation
NPL	Non-Performing Loans
OECD	Organisation for Economic Co-operation and Development
OVCF	Outgrow Value Chain Fund
P2P	Peer to Peer
PBL	Prudential Bank Limited
PC	Principal Components
PCA	Principal Components Analysis
PWC	Price Waterhouse Coopers
RAROR	Risk-Adjustment Rate of Return
RM	Relationship Manager / Risk Manager
RoA	Return on Assets
RoE	Return on Equity
RoG	Republic of Ghana
SAEF	School of Accounting, Economics, and Finance

SARB	South African Reserve Bank
SBG	Stanbic Bank Ghana
SMEs	Small and Medium-Term Enterprises
SPFS	Standard and Poor Financial Services
SPSS	Statistical Package for Social Sciences
UKZN	University of KwaZulu-Natal

CHAPTER ONE

INTRODUCTION

1.1 Introduction and Background

Agriculture plays an important role in the economy of Ghana. The sector employs 70 percent of rural Ghanaians as indicated by the Ghana Shared Growth and Development Agenda (GSGDA) in 2018 (GSGDA, 2018) and 70.6 percent in 2020 (GSGDA, 2021). Following this, the Ghana Statistical Service (GSS) indicates that agriculture remains the main pillar of economic development in Ghana (GSS, 2017). Ghana and West African countries such as Nigeria, Togo, and Mali depend largely on agriculture for survival (Gyapong, 2021). The Ministry of Finance (MoF) confirms the large dependence of Ghanaians on agriculture for food security, jobs, and the provision of raw materials to feed the local industries (MoF, 2018). The agricultural sector contributes significantly to the GDP growth in Ghana than all the other components of the economy such as the services and industry sectors. The agricultural sector contributed the largest amount of GDP amounting to between 45 and 51 percent, providing 45 percent of all export earnings, generating 12 percent of tax revenue, and employing at least 80 percent of the total population of Ghana through farming, the farm produces distribution and provision of other services between 2012 and 2016 (Abdallah, 2016). Real agricultural GDP contributed about 2.9 percent in 2016, an additional 6.1 percent in 2017, just 4.8 percent in 2018, and a remarkable 6.9 percent in 2019 (MoFA, 2020). The sector also provides food to Ghanaians and supplies raw materials to feed the local industries. Therefore, to boost this important sector, the 2020 and 2021 national budget statements emphasised the need for adequate, effective, and efficient finance.

The significant contribution of agriculture to the economy, therefore, requires sustainable finance methods. In this study context, agricultural finance is explained as the total credit granted to the agricultural sector by commercial banks to stimulate agricultural activities for sustainable economic growth (Abdullah, Maamor, & Mohamed, 2013; Agbada, 2015; Amadhila & Ikhide, 2016). Agricultural finance comes in various forms. Successive governments in Ghana have tried to increase agricultural finance through agricultural programmes such as the provision of farm inputs (MoFA, 2020). Agricultural finance can also be in the form of government guarantees

on loans granted for agricultural purposes, imposition of quotas on loans extended to farmers, and subsidised interest rates on specific such loans (Amedi, Dumayiri, & Mohammed, 2019). Also, institutional credit schemes received by Ghana from donor countries such as the USA and Canada in the form of agricultural credit and technology support for farmers to promote agricultural activities serve as forms of agricultural finance (Amedi et al., 2019). Further, Ghanaian commercial banks also grant credit facilities for agricultural activities (BoG, 2020b). Ghana Commercial Bank (GCB), Prudential Bank (PBL), Agricultural Development Bank (ADB), and Stanbic Bank Ghana Ltd (SBG) are some of the most important players in finance agriculture in Ghana (BoG, 2020).

Agricultural finance comes with significant risks (Misra, 2021). Lending to the sector has been challenging therefore due to the associated high credit risk (BoG, 2020). Some of the agricultural credit risks experienced by commercial banks include counterparty default risk. This risk arises from the possibility of defaulting in the repayment of principal and interest by borrowers on credit granted (Apanga, Appiah, & Arthur, 2016). As a result of this possibility of default in both principal and interest on loans granted for agricultural purposes, Ouma (2016) contends that finance the agricultural sector in emerging economies is inadequate due to such high risk. Similarly, the banking sector report of the Central Bank of Ghana (BoG, 2018) indicates that the agricultural sector has inadequate finance as a result of high default rates. As a result, the Ghana Poverty and Inequality Report (GPIR, 2016), posited that only 8 percent of rural Ghanaians can access credit to invest in agriculture. This is because commercial banks have, over the years, employed inadequate credit risk management strategies associated with agricultural finance. Essentially, the sector is perceived as high lending risk (Konovalova, Kristovska, & Kudinska, 2016). Consequently, credit risk management remains phenomenon significant challenge and undertaking among commercial banks in agricultural finance. This suggests that the commercial banks lack adequate and effective strategies for the management of credit extended to the agricultural sector (Lagat, Mugo, & Otuya, 2018).

To find solutions to the inadequate and often ineffective credit risk management practices¹, some measures of good risk management practices have been suggested (Abu & Al-Ajmi, 2012) and (Basel, 2010; Konovalova et al., 2016). These strategies and practices include restructuring of loans by suspending lending to enterprises considered prone to high risks, assessment of credit history of the borrowers, the amount of loan offered, terms of loans, the average income of borrowers, and proactive deliberate regulatory surveillance on sectoral credit allocation. Another strategy suggested is the monitoring in agricultural finance to mitigate credit risk rather than mere policies (Scannella & Polizzi, 2021). The effects of loan restructuring, credit risk assessment of borrowers' history, and regulatory surveillance on agricultural by commercial banks have not been critically evaluated in research. Credit risk management practices in this context refer to the systematic ways of identifying, managing and addressing possible outcomes of credit risk and crafting the necessary strategies to accept, avoid or minimize the impact of such risk (Apanga et al., 2016). Therefore, to examine the effectiveness of credit risk management practices amongst commercial banks in agricultural finance, this study investigates the methods used in identifying risks to mitigate credit risk. Secondly, the study evaluates the implementation of credit risk management policies in commercial banks. Lastly, the strategies used by commercial banks to mitigate credit risks in agricultural finance in Ghana are also explored.

1.1.1 Overview of Agricultural Finance in Ghana

Agricultural and its finance take on different categories involving small, medium and large agribusiness enterprises (Doran, McFadyen, & Vogel, 2009). Appiah-Twumasi, Donkoh, and Ansah (2019) also confirm and indicate that agricultural finance in Ghana involves small, medium, and large agribusinesses. Ali, Agyekum, and Adadi (2021) describe agricultural finance to involve small-medium and large agricultural business enterprises. Therefore, to provide financial needs for small, medium, and large agribusinesses, the Ghana Commercial Bank (GCB) was established in 1953 as the Bank of Gold Coast until 1957 when it was renamed GCB after Ghana gained independence. The bank acquired the Capital and UT banks in 2017 and

¹ Credit risk management practices are those activities which involve the methods used to identify credit risk, effective implementation of credit risk management policies and the best strategies that can be used by commercial banks to minimise credit risk exposure (Scannella & Polizzi, 2021)

has its head office in Accra. It currently has 214 branches across Ghana as at December 2020 (GCB, 2020). The purpose of the bank was to provide financial services and credit facilities to the indigenous agricultural business community in Ghana (Asiedu & Fosu, 2004). However, GCB's operation has been characterised by high default rates resulting in a persistent decline in the availability of credit extended to agricultural (Agyapong, 2015; BoG, 2018). Resulting from the default, ADB bank was instituted through Act 286 in 1965 by the Government of Ghana (GoG) to increase access to agricultural finance (BoG, 2017). ADB gained a universal banking license in 2004 with its head office located in Accra (BoG, 2020). ADB has 54 branches, 4 farm loan offices, and 68 service outlets as of December 2020 (ADB, 2020).

The Central Bank of Ghana also approved the establishment of more banks such as Stanbic bank Ltd (SBG) and Prudential Bank Ltd (PBL) to strengthen credit lines and increase access to agricultural credit (SBG, 2020). Stanbic Bank was established in Ghana in 1999 after the Standard Bank Group acquired majority shares in Union Mortgage Bank (BoG, 2020). Stanbic Bank has grown over the years after acquiring a Universal banking license in 2004 (BoG, 2020). Stanbic Bank has 36 branches with its head office situated in Accra (SBG, 2020). Prudential Bank was incorporated in 1993 and started operations in August 1996 under the Companies Code 1963, Act 179. The bank has its head office located in Accra with 43 branches as of December 2020 (PBL, 2020).

Lending to the agricultural sector has been inadequate due to the high risk associated with the sector (BoG, 2018), despite the high demands for agricultural loans. Reports indicate that even though gross loans increased by 32.4 percent to GH¢ 39.4 billion (\$7.6 billion) between 2018 and 2019 (PWC, 2020), this was far less than the increase in loans to other sectors. For example, the housing sector witnessed growth in loans by 158.8 percent, whilst the transport, storage and communication sector experienced a loan growth of 118.4 percent. This is in stark contrast to the 94.9 percent extended for the agricultural, forestry and fishing sector between 2018 and 2019 (PWC, 2020). For the annual loan allocation in 2019, the commerce and finance sector received the highest share of credit allocation amounting to 22.9 percent as at June. This is closely followed by the service and manufacturing sectors with a share of credit allocations of 22.1 percent and 11.6 percent respectively (BoG, 2019). In turn, the electricity, water and gas sectors received a 9.6 percent share of credit allocation, while the agricultural, forestry and

fishing sector received a mere 4.5 percent. This allocation represents the second-lowest share of credit allocation in the economy, with the mining and quarrying sector trailing at 3.6 percent during the period (BoG, 2019).

Commercial banks such as Bank of Africa, United Bank of Africa, Consolidated Bank Ghana Ltd, Omni Bank Ghana Ltd, FBN Bank, Standard Chartered Bank, CalBank, Zenith Bank, Access Bank, Universal Merchant Bank, Societe Generale Bank, National Investment Bank, Guaranty Trust Bank, First Atlantic Bank and Republic Bank lend little to the agricultural sector (BoG, 2019). These banks concentrate mostly on personal and scheme loans which are easy to manage. These financial institutions have simply relegated agricultural finance to the margins in terms of credit lines (GCB, 2020). ADB, PBL, GCB, and SBG are some of the main banks that still finance agricultural activities in Ghana but they do not provide sufficient credits that the sector needs to develop (BoG, 2020a). The emerging implication is that Ghanaian commercial banks must adopt best practices to manage and mitigate credit risk and consequently encourage their lending lines for the agricultural sector.

1.1.2 Credit Risk Management in Agricultural Finance

Credit risk management remains significant to the survival of Ghanaian commercial banks in agricultural finance (Boateng, 2019). Generally, agricultural finance involves the risks of lending to agricultural sector activities and the need to adopt the best practices to manage credit risk among commercial banks (Doran et al., 2009; Kessey, 2015). It has been argued that banks in Africa are faced with interrelated risks and that commercial banks have different strategies in managing them (Demeke, Kiermeier, Sow, & Antonaci, 2016). As indicated by Gadzo, Kportorgbi, and Gatsi (2019) credit risks are categorised by the likelihood of occurrence, the extent of their impact, and methods of managing them among Ghanaian commercial banks. Many commercial banks in Ghana have created credit risk management departments (Kessey, 2015). Risk management practices adopted by Ghanaian commercial banks involve adopting the best methods to identify credit risk, effective implementation of credit risk management policies and embracing the best strategies to mitigate credit risk associated with agricultural lending (ADB, 2020; GCB, 2020). In other jurisdictions such as Nigeria, during the banking crises, banks do not only take extreme risks but adopt effective practices to mitigate credit risks. These practices differ from bank to bank (Adeusi, Akeke, Adebisi, & Oladunjoye, 2014).

Categorically, most commercial banks in Ghana faced credit risk associated with agricultural lending (ADB, 2019; ECB, 2019; GCB, 2020). This calls for the need to effectively manage credit risk among Ghanaian commercial banks. The inability to efficiently and effectively mitigate credit risk associated with agricultural lending could result in liquidation or bankruptcy. This bankruptcy affected UT and Capital Banks in 2017. Beige, Sovereign, Unibank, Construction, and Royal Bank were also liquidated whilst the Heritage Bank and Bank of Baroda exited the market on their own decisions (BoG, 2018). This prompted the Central Bank of Ghana to institute actions to stabilise the banking sector. The collapse of the banks led to an increase in the capital requirements of banks to GHS400m (\$83m) indicated in the 2017 Ghana banking sector report. These banks were liquidated partly because of their inability to manage credits given to the agricultural sector. Most of the loans taken by clients for their agricultural activities could not be recovered and this lapse put these banks into serious liquidity problems. GN bank was also later liquidated in 2019 (BoG, 2019) for similar reasons.

One major issue in the central bank report is the ability to manage credit risk (BoG, 2018). The gravity of credit risk associated with non-performing loans in the agricultural sector has caused commercial banks to increase their interest rates in lending to the sector. Following the high risk, the 2017 Ghana Banking Sector Report considered the agricultural sector as the second-highest sectoral non-performing loan (NPL) ratio, constituting about 33.9 percent, and this automatically reduced the bank earnings (BoG, 2017). Loan advances to the agricultural sector range between thirty-five and forty percent with a short repayment period (BoG, 2017). Based on the high default rates, the high interest rates and conditions for repayment make such loans unattractive. Besides, the agribusiness indicators in Africa show that farmer-based entities and smaller agro-enterprises attract higher interest rates with short repayment periods due to the high risk associated with the sector (Babu & Shishodia, 2017). Risks can affect the performance of the banks and reduce profitability. If there are ineffective practices adequate to mitigate these risks, banks are exposed to liquidation problems. Credit risks have not been effectively managed by commercial banks in Ghana and this, in turn, has negatively affected the performance of these banks.

Few studies in Africa have generally and broadly focused on credit risk management and risk faced by farmers even though commercial banks continue to battle high credit risk associated

with agricultural lending. Credit risk associated with agricultural lending faced by commercial banks is not well explored and that makes this study very unique and different. Also, existing studies concentrated on panel data and survey questionnaires as major sources of information on credit risk management practices in Africa. Unlike the few African studies, on credit risk management, the combination of interviews, policy documents from the BoG, and survey questionnaire provide the best triangulation presenting the most accurate inferences on credit risk management practices. This study explores the credit risk faced by Ghanaian commercial banks in agricultural finance. This is the most palpable risk associated with agricultural lending. Credit risk, therefore, takes a central position in this study.

1.2 Problem Statement

Agriculture plays a significant role in the Ghanaian economy as it provides jobs and serves as the main source of food supply (Ayerakwa, Dzanku, & Sarpong, 2020). Even though Ghana has the potential to meet its food demand, the country depends largely on imported fresh agricultural goods. The importation ranged between 8-14 percent for primary agricultural products and 47 percent for agro-processing products in 2017 (Andam, Arndt, & Hartley, 2017). From this viewpoint, focussing on the agricultural sector is essential for growth and development in Ghana. However, the Ministry of Food and Agriculture (MoFA, 2018) confirmed that the proportion of credits granted to the agricultural sector has been declining over the years in Ghana. The Ministry of Finance in Ghana, therefore, emphasises the need for adequate finance in the agricultural sector (MoF, 2018). This implies that agriculture heavily depends on lending from the banks. However, demands for agricultural finance by Ghanaian commercial banks have been severely impeded by high credit risk and have made the sector stagnant for many years (BoG, 2021). High credit risk associated with agricultural finance becomes a serious problem among Ghanaian commercial banks that has not been addressed and needs to be tackled. Meanwhile, the credit risk management problem associated with agricultural finance has been confronted head-on by the Ghanaian banking industry in recent times (Boateng, 2019). If the Ghanaian banking industry has confronted credit risk management problems associated with agricultural finance, then why the persistence high credit risk in these banks? The major cause of bankruptcy of some Ghanaian banks was partly attributed to high credit risk exposure associated with agricultural lending. This is manifested by the recent liquidation, collapse and consolidation of several banks in Ghana. The revoking of the licenses of UT and Capital banks

in August 2017 and the consolidation of Royal bank, Unibank, Beige bank and Sovereign bank in August 2018 partly resulted from this inability on the management of the banks to adopt effective and efficient credit risk management practices in agricultural finance. Banks in Ghana are expected to increase their support to the agricultural sector, but the sore fact of risk stalls such an undertaking. This means commercial banks need to identify all risks associated with agricultural lending and develop appropriate strategies. These banks need to have proper methods of evaluating agricultural lending risks. In a nutshell, these banks must develop and implement effective credit risk management policies and design appropriate strategies to manage or mitigate credit risk associated with agricultural lending. However, the level of bank failure in Ghana leaves many questions unanswered on credit risk mitigation practices specifically in the area of agricultural finance: What are the methods used for identifying credit risks by commercial banks in agricultural finance? Are the policies effectively implemented? What strategies are used by commercial banks to mitigate credit risk in agricultural finance? Existing literature such as Apanga et al. (2018), Appiah-Twumasi et al. (2019), Ayerakwa et al. (2020), Baassiri and Bizri (2018), Boateng (2019), Kessey (2015), Kusi, et al, (2016), Lagat et al. (2019) and Sackey (2018) provided a general description of credit risk management but have not answered these questions on agricultural finance. There is a dire need to interrogate these aspects and this study fills that gap. The immediate implication is that commercial banks might not have appropriate credit risk identification methods. Further, although commercial banks could have policies related to mitigation, some of them might not be effective and there could be concomitant challenges in implementing these. Additionally, it is not clear whether the risk-mitigating practices adopted by commercial banks in Ghana are adequate or not.

1.3 Research Objectives

The study aims to investigate the credit risk mitigation practices of Ghanaian commercial banks in agricultural finance. To achieve this aim, this study developed the specific objectives designed to:

1. Examine the methods used by Ghanaian commercial banks to identify credit risks in agricultural finance;
2. Assess the effectiveness of the implementation of credit risk management policies of Ghanaian commercial banks in agricultural finance; and,

3. Establish the effectiveness of credit risk mitigation strategies used by Ghanaian commercial banks in agricultural finance.

1.4 Research Questions

To achieve the above objectives, the proposed study addresses the questions below:

1. What are the methods used by Ghanaian commercial banks to identify credit risks in agricultural finance?
2. How effective is the implementation of credit risk management policies of Ghanaian commercial banks in agricultural finance?
3. How effective are credit risk mitigation strategies used by Ghanaian commercial banks in agricultural finance?

1.5 Significance of the Study

With agricultural lending being a highly risky undertaking, this study presents a timely investigation of the credit risk management practices of commercial banks in Ghana concerning agricultural finance. In an emerging economy such as Ghana where agriculture is the mainstay of the economy, calling for adequate finance, specific attention must be directed at the formulation of effective credit risk management practices to encourage agricultural lending as a viable business. Few studies in Africa have focused on agricultural lending even though commercial banks continue to battle credit risk associated with this aspect. There is therefore a need to investigate credit risk management practices of commercial banks in agricultural finance. To the best of the researcher's knowledge, the effectiveness of credit risk management practices of commercial banks in agricultural lending has not been adequately explored to reduce risk exposure. This study is designed to take a broad investigation into the credit risk management practices of commercial banks in agricultural finance. Unlike the few studies on credit risk management available in Africa, the combination of thematic, document, and principal component analysis is perceived as offering the correct inferences on credit risk management practices. This study identifies the appropriate methods of identifying credit risks and effective implementation practices. It identifies the best strategies in mitigating credit risk to promote agricultural lending as a viable business. This study provides a framework for building the capacity of the banking staff and equipping them with empirically informed practices to minimize

credit risks in commercial banks. It also informs regulators of the need to closely monitor commercial banks on the implementation of risk management policies to minimize credit risk associated with agricultural lending. The study provides useful information to policymakers and banks on the best credit risk management practices applicable in minimizing credit risk of commercial banks in agricultural finance in Ghana.

1.6. Methodological Scope

The study employed both quantitative and qualitative approaches to provide a comprehensive understanding of the research problem than either approach singly. Mixed methods allow for multiple methods of data drawn from the questionnaire, interview, and policy documents. The data was gathered from primary and secondary sources. The primary source of data was the staff of four Ghanaian Commercial Banks (GCB Bank Ltd, Prudential Bank Ltd, ADB Bank Ltd, and Stanbic Bank Ghana Ltd). The researcher used questionnaires adapted from Afande (2014) and modified these to suit the Ghanaian context. The four selected banks are the most widely distributed in Ghana and they are at the forefront of finance agricultural activities over the country (Ofori-Nyarko, 2017). The questionnaires were used to gather quantitative data whilst an in-depth interview was used to gather qualitative data from credit officers based at the head offices of the four selected banks. The secondary source of data was from policy documents of the Central Bank of Ghana. These documents provided additional information for content and thematic analysis. The analysis was done in three ways. First, document analysis provided a general, broad view and understanding of some of the policies regulating the Ghanaian banking sector. The purpose here was to assess whether or not specific policies specifically regulate agricultural finance in Ghana. This means that there was an assessment of the effectiveness of the policies. The second phase of analysis was quantitative and this was carried out using participants' responses to identify and evaluate the opinions of participants on credit risk management practices of commercial banks in agricultural finance. Lastly, thematic analysis was conducted using in-depth interview data to explore additional information on credit risk management practices from the experiences of credit officers and managers. This data supplemented the information gathered through document analysis and the questionnaire. In the final version, this allowed the researcher to compare qualitative and quantitative results and thereby draw significant conclusions. To determine the credit risk identification methods used by commercial banks, the Principal Component Analysis (PCA) of the factor analysis model was

used to explore the Ghanaian Commercial Banks' model of credit risk management practices on agricultural finance. The study analysed policy documents from the banking sector supervision department of the Central Bank of Ghana in a bid to ratify the efficacy of the credit risk strategies.

1.7 Delimitations

The purpose of this study is to investigate the effects of credit risk management practices of Ghanaian commercial banks on agricultural finance. This is a broad topic that could be explored from different angles. However, this study focused on credit risk management practices from the banks' point of view without extending it to borrowers and other macroeconomic sectors. The investigation examines the methods adopted by commercial banks to identify credit risk in agricultural finance, the effectiveness of the implementation of credit risk management policies, and the strategies adopted by Ghanaian commercial banks to mitigate credit risk in agricultural lending. The study does not assess all the commercial banks in Ghana. Out of the 23 commercial banks in Ghana, four banks were purposively selected for this study. This is because, apart from being sources of agricultural lending, these four were the only banks that gave their consent to participate in this study in 2020. The data was collected at the time that the Covid-19 pandemic gained global attention and banks closed down in Ghana. The selected banks still provided a representative sample to conclude the study.

1.8 Organisation of the study

This study is composed of eight chapters structured as follows: Chapter one offers the introduction and background to the study. Key research questions are raised as well as the objectives and justification for the study. Chapter two deals with an extensive review of literature on credit risks management theories such as Economic Utility Theory, Liquidity Theory of credit risk, Tax Theory of credit risk, Adverse Selection Theory, Morden Portfolio Theory, and Credit Referencing Theory. The purpose of this chapter is to provide the theoretical framework as well as context for the study. Chapter three provides a detailed review of the recent and empirical literature on the study and helps identify the gaps in the related literature. Chapter four describes the methodology and empirical models used to achieve the objectives of this study. The chapter describes the sources of data collection, data collection techniques, and sample procedures. The chapter describes how the PCA of the factor analysis model and thematic analysis procedure was used to achieve the objectives. Chapter five presents a content analysis and

review of key policy documents and compliance frameworks of the Central Bank of Ghana on banking sector supervision. The purpose here is to provide an analysis of the policy documents used by the Central Bank of Ghana in supervising commercial banks, linking the discussion to the interview and questionnaire results. Through this analysis, gaps in policy and supervision strategies are identified. In chapter six, the results of the various models are presented. The essence of this chapter is to analyse and interpret the results concerning the models used and the in-depth interview conducted. Chapter seven discusses the key findings to establish whether these conform to the risk management theories and conclusions identified in the existing literature. Finally, chapter eight summarises the thesis and assesses the implications of the findings. The study concluded by proffering recommendations and suggestions for further studies on credit risk mitigation strategies in finance agriculture.

1.9 Chapter Summary

This chapter offered an introduction to the study, the specific background and an overview of agricultural finance in Ghana. It highlights the significance of agriculture and the need for adequate finance through Ghanaian commercial banks. Finance agriculture comes with a high risk which needs to be managed. Ghanaian commercial banks have been confronted with credit risk management challenges associated with agricultural lending over the years. This is evidenced by the recent collapse of UT and Capital banks and the consolidation of Royal Bank, Unibank, Beige Bank, and Sovereign bank which was partly due to the high credit risk in the sector. The main objective of this study is to examine the methods used by Ghanaian commercial banks to identify credit risks in agricultural finance; assess the effectiveness of the implementation of credit risk management policies of Ghanaian commercial banks in agricultural finance; and, assess the effectiveness of credit risk mitigation strategies used by Ghanaian commercial banks in agricultural finance. Therefore, this study is justified and timely in its intent to identify appropriate credit risk identification methods, effective implementation of credit risk management practices, and identifying the best strategies to mitigate credit risk to promote agricultural lending as a viable business. The study is structured in eight chapters. The following chapter analyses the conceptual and theoretical framework supporting this study.

CHAPTER TWO

CONCEPTUAL AND THEORETICAL LITERATURE

2.1 INTRODUCTION

This chapter examines the conceptual and theoretical literature on credit risk management practices of commercial banks. The chapter is structured into 4 sections. The first section 2.1 provides a detailed description of the introduction which involves some key basic concepts and credit risk management in agricultural lending elaborated, the role of the banking supervision department of BoG in section 2.1.2, and the Basel accord in risk management depicted in section 2.1.3. The second section 2.2 discusses the conceptual framework while the third section 2.3 highlights the theoretical framework employed in this study. Section 2.4 provides a brief overview of agricultural credit supply. The last section 2.5 summarises the chapter and offers a conclusion.

2.1.1 Concepts and Credit Risk Management in Agricultural Lending

This section examines the basic concepts and credit risk management in agricultural lending. In a study on the impact of Basel III bank regulation on US agricultural lending, agricultural lending was defined as a process of granting credit to individuals and agribusiness for agricultural activities (Kim & Katchova, 2020). Agricultural lending plays a significant role in most emerging economies such as Ghana. In a study on banks in Serbia, apart from boosting production, agricultural lending contributes immensely to GDP growth, increases food supply and the performance of banks if the risk is well managed (Ristić, Todorović, & Jakšić, 2018). Despite its significance, agricultural lending is associated with some limitations. In a study on US agricultural lending, it was established that the agricultural sector is highly risky (Brester & Watts, 2019). Also, there is inadequate credit supply as a result of the high credit risk associated with agricultural lending. **Credit risk** has been defined as the possibility of loss due to borrowers' defaulting on loans (Afriyie et al., 2018). **Credit risk** is also defined as the possibility of a threat that an actual return may not be the same as expected (Osayi, Dibal, & Ezuem, 2019). Brown et al. (2016) referred to **credit risk** as the inability of parties in a contract to meet their obligations of the terms of the contract as they fall due. They classified credit risk as default risk, performance risk, or counterparty risk. **Default risk** is the risk that a lender takes on in the event

that a borrower may not make the required payment on loan obligation (Brown et al., 2016). Also, **performance risk** is the risk that a product, service, project, or programme may not yield as much value as expected (Osayi et al., 2019). More so, **counter-party risk** is the probability that the party in an investment, credit, or trading business may not fulfill its part of the agreement and may contractually default in meeting its obligations (Tchamyu, 2019). The best tool for the maximization of the **adjusted rates of risk** in banks is **effective credit risk** management (Boateng, Liu, & Brahma, 2019; Were & Wambua, 2014). The **adjusted rate of risk** is the relationship between risk and returns (Osayi et al., 2019). The Eastern Caribbean Central Bank (ECCB, 2009) report stated that banks must effectively manage credit risk exposure within acceptable parameters. Risk management has been described as a system of proactive action taken in the present for the future (Serwadda, 2018). **A risk management framework** identifies potential threats to organisations and defines the possible strategies to eliminate the impact of risk (Bertoldo, 2020). To achieve this, therefore, commercial banks must adopt reliable credit risk identification methods, effective implementation of credit risk management policies, and efficient strategies to determine the performance of loans and reduce the threat of exposure to credit risk. **Credit risk management** is a tool used by management to eradicate, minimise, manage risk, improve benefits, and avoid the harm of taking such risks (Tchamyu, 2019). Therefore, banks must proactively manage credit risk arising from various borrowers and inherent risk in the entire portfolio of loans for their survival (Nguyen & Nguyen, 2020).

Credit risk management is a process of adopting effective practices to control and mitigate credit risk (Martin & Clapp, 2015). The process conforms to the standard risk management framework which involves risk identification, risk analysis, monitoring, evaluation, and mitigation of risk (Bertoldo, 2020). Demeke et al. (2016) argued that risk management instruments in agricultural finance involve risk coping (RC), risk-bearing (RB), and risk mitigation (RM). Credit risk can be managed by transferring the risk (Antón et al. 2013; OECD, 2013). Commercial banks in Ghana mitigate these inherent risks by identifying, measuring, and monitoring risks subject to risk limits and controls. Credit risk is the most threatening among all the risks faced by banks (Muro, Magutu, & Getembe, 2013). Proper systems were also recommended and instituted to increase loan repayment from borrowers (Mokatsanyane, Muzindutsi, & Viljoen, 2017). In totality, credit risk management practices protect banks from credit risk and enable these banks to grow in terms of their operations and financial performance (Boateng et al., 2019).

Boateng et al. (2019) describe credit risk management as a process of reducing earnings volatility to avoid large losses. In effect, banks must act proactively by identifying, quantifying the risk, and developing measures to effectively mitigate credit risk exposure (Le & Diep, 2020). Credit risk management in banks involves a comprehensive approach of identifying credit risk faced by the banks, effective implementation of good policies, adapting the best strategies, and effective monitoring to reduce risk exposure (Odonkor, 2018). Osayi et al. (2019) indicate that the process of standardisation, contract, and measures taken to prevent incorrect or inefficient financial decisions as well as portfolio constructions that generally benefit diversification from different borrowers are effective practices in avoiding credit risk. They further argue that rescheduling and sale of loans effectively help in the diversification of credit risk by exploiting the law of large numbers of investment portfolios of assets. Muninarayanappa (2004) developed a credit risk management principle that should be used by senior managers in banks in all policy decisions of credit risk management. The combination of credit risk management strategies and policies is critical to successful credit risk management in protecting and improving the loan quality of banks (Muninarayanappa, 2004). In another instance, diversifying among different asset groups exposed to credit risk could minimize total credit risk in the portfolios of assets thereby increasing the probability of full or partial repayment of interest and principal (Osayi et al., 2019).

Diversification, however, can reduce the banks' specific credit risk but not systemic credit risk (Zamore, Beisland, & Mersland, 2019). Therefore, Brown and Moles (2016) identify three basic characteristics associated with credit risk namely; the exposure to borrowers who may either not repay loans or may be affected by adverse change performance ability; the likelihood of default probability on obligations; and the amount that can be recovered if a default occurs. Brown and Moles (2016) argue that credit risk exposure is likely to be greater if the first two characteristics are larger and vice versa. Factually, banks constitute a major part of the financial markets in Ghana and any decision has a replicable effect on the economy of Ghana as well as global financial health concerns.

The world observes a lot of predicaments that start from the banks and then spread to other financial sectors typically of which is the global economic downturn in 2008 (Hodson, 2009; Mishkin, 2011). The question of a sound and safe business in the banking sector; and the

significance of a relevant feasible framework for effective credit risk management associated with agricultural finance in commercial banks are now more alarming and significant than ever (Le & Diep, 2020). Credit risk management in this modern world undeniably occurs in a dynamic context that takes on a much greater scale than in a stable economic climate (Rao, Liu, Goh, & Wen, 2020). The result is the more urgent need for higher risk diversification, better predictions, and reliable strategies to counteract possible risks in the global financial market. These could be encouraged by creating and developing a substantial number of risk identification methods, mitigation instruments, and effective implementation of credit risk management policies (Zamore et al., 2019). The methods used in the quantification of credit risk should be accompanied by a distinct transparency requirement which includes a quantitative assessment of the methods and robustness of statistical methods (Rodina, Zavadskaya, & Kurchenko, 2013). The authors concluded that transparency of methodologies used in credit risk management should be a bedrock feature for the assessment of credit risk. It has been argued that methodological transparency is the precision of the mathematical method employed. This is designed to reduce elements of subjectivity in expert assessment, the clarity and simplicity of the results of assessing the risk analysis. Such an undertaking is enhanced through a full understanding of banks' employees of the results as well the ability of regulatory authorities and customers to access a given method (Konovalova et al., 2016; Rodina et al., 2013). Therefore, banks must quantify factors, analyse the risk involved, consistently monitor and control credit risk.

Also, risk management policies must be well designed and implemented. The policies in practice generally provide standard models, processes, practices, management tools, criteria for evaluation, and reviewing the time intervals used for implementation of entire systems of banks (De-Ramon & Straughan, 2020). The policies are reviewed on an annual basis except for unexpected occurrences that need an immediate response (Apanga et al., 2016). Even though banks play major roles to protect themselves against unfavourable conditions, banking regulators have more vital responsibilities to play (Olawale, 2015). In most countries, banking falls under strict supervision despite the growing number of deregulations and liberalisation (Lall, 2012). This is because banks collect deposits from ordinary savers and play a major role in making payments and credits out of the savings to borrowers (De-Ramon & Straughan, 2020; Dia, 2013). Should the banks fail to meet their obligation in keeping depositors' savings safe, the

governments become the last rescuers normally referred to as the lenders of last resort (Crouhy, Galai, & Mark, 2006).

As a result, commercial banks are required to meet the minimum capital requirements recommended and comply with the requirements of Basel II to mitigate against potential credit risk exposure in agricultural lending (BoG, 2020). The general aim of Basel II which replaces Basel I, 1988, is to ensure that the capitalisation² of banks is adequate and proper enforcement of credit risk management enhances stability in the banking sector. This is achieved through specifying the minimum capital requirements, effective supervisory review, and reliable market discipline (Basel, 2015). Many developed countries have adhered to the Basel accord. However, most developing nations including Ghana are yet to fully adopt the Basel accord. Therefore, the central bank of Ghana has a significant role in issuing a nationwide policy for controlling and guiding banks to implement them and do follow-ups on banks' performance to improve credit risk management (BoG, 2020b). Consequently, credit risk management is crucial in managing a credit portfolio. It involves the identification of potential risk, risk measurement, treatment of risk, and evaluation of models to mitigate risk (Prashant & Kavita, 2016). The argument is that risk management improves financial stability in banks by clearly defining and implementing policies for granting credit to customers. Therefore, effective credit risk management (CRM) practices enable banks to determine profitability, liquidity, and soundness in banking operations (Le & Diep, 2020). This assists banks in designing systems of frameworks at the organizational level to attain the prescribed limits of risk exposure (De-Ramon & Straughan, 2020).

The CRM includes all the components of the credit process for an in-depth understanding of credit risk management. One can begin to manage the loan portfolios of banks after the risk represented by individual borrowers and credit services are determined (Konovalova et al., 2016). Assessment of the credit risk of borrowers involves both qualitative and quantitative indicators of the borrowers' economic situation such as credit history, character, experience, and cashflow among others (Weber & Musshoff, 2017). Assessment of risk factors, as well as comprehensive and systematic analysis, provide more information for banks to consider critical

² Capitalization of banks deals with capital structure of banks, thus the minimum capital requirement required to operate as a commercial bank (BoG, 2020). In Ghana, the minimum capital required by the Central Bank of Ghana is Four Hundred Million Ghana Cedis.

factors in credit risk management to prevent recurrent and adverse impacts on the future operation of banks.

Furthermore, banks should be able to quantify the most relevant credit risk component factors to aid in the analysis, forecasting, and managing of credit risk (BoG, 2020). It, therefore, means that the decision of banks to either grant or refuse to grant loans, about the rate of interest, and about loan default level provision depends largely on the accuracy of the assessment of risk. Assessing the accuracy of risk factors can be evaluated relative to the number of errors in the recognition criteria of 'bad' or 'good' loans and their cumulative average number (Malekipirbazari & Aksakalli, 2015). Accuracy can also be examined in the same method when the loans are grouped into more than two classes. An effective credit risk management should be universal, comprehensive, focus on banks' profitability and long-term survival amid environmental changes or constraints to mitigate credit risk effects on agricultural finance and achieve the objectives of commercial banks.

Commercial banks share similar features with other banks and corporate entities but yet contain distinct characteristics and as a result, some of the credit risk management techniques used would be different (Singh, 2013). Credit risk involves a combination of risk exposure and default risk (Singh, 2013). As a result, Boguslauskas and Mileris (2009) posit that efficient credit risk management greatly influenced the success of banks in Lithuania. Therefore, good credit risk management practices boost banks' profitability by minimising risk and avoiding the possibility of bad loans. Consequently, there is a need for banks to develop efficient risk management strategies, good policies, and effective implementation of policies by senior managers to avoid the possible negative effects associated with credit risk.

A judgmental pattern of Character, Ability, Means, Purpose, Amount, Repayment, Insurance Interest, Commission, and Extras usually referred to as the **CAMPARI**, and **ICE** has been adopted by the banks to provide consistency in reporting and grouping attributes into categories (Afande, 2014; Brown & Moles, 2016). The CAMPARI concept which communicates the performance of lending risk is interpreted and discussed. **C** represents the character of borrowers. Character is the borrowers' integrity. Borrowers with honesty are most likely to fulfill their obligations (Lynam, 2019). Therefore, borrowers who lack integrity are most likely to default or provide wrong information regarding their need for loans (Lynam, 2019). **A** represents the

ability of borrowers to act successfully and Lynam (2019) describes this as the capacity of borrowers to execute a project. **M** represents the means of payment. It is imperative for commercial banks to be interested in knowing whether or not borrowers in the agricultural business value chain finance have the necessary experience and relevant qualifications after loan granting. This means a full understanding of the means of repayment according to the availability of resources of borrowers (Brown and Moles, 2016). Means are the financial, technical, and managerial aspects of borrowers. Borrowers' expertise and capacity in these dimensions enhance the loan recovery rate (Brown and Moles, 2016). The means of repayment must be stated clearly before banks grant loans to borrowers. The repayment ability of borrowers is significant in lending and must be established not only by future accounting profit but by the projection of future cash flows (Mbroh & Koomson, 2015). Therefore, lenders must consider the repayment structure presented by borrowers in deciding the kind of lending.

P denotes the purpose of the loan, indicating the reason why the loans are granted. The purpose for which loans are granted must be clear and accepted by the borrower (BoG, 2020b). For instance, an acceptable purpose for taking a loan could be borrowing to finance the rapid progress of a business and should be unambiguous. **A** indicates the amount in both absolute and relative terms. The amount is the value of the loan which is sufficient to meet the purpose for which the loan is granted (Mbroh & Koomson, 2015). The amount is the face value of the loan and does not include the interest or cost on the loan of banks (Boguslauskas & Mileris, 2009). **R** represents the likelihood and mode of repayment by borrowers. Repayment represents the ability of borrowers to repay the principal of the loan and all related interests (Randall, Hughes, O'Brien, Rouncefield, & Tolmie, 2001). The repayment of borrowers should be demonstrated through honest cash flow and not through the projected accounting profit of the borrower (BoG, 2019). The insurance security that the bank relies upon if the loan is not repaid is denoted by **(I)**. Insurance is the safety net that the bank relies upon when the loans go bad (Figueiredo, Martina, Stephenson, & Youngman, 2018). Banks must ensure the loans given to customers to prevent future losses and minimise credit risk exposure in agricultural finance (Figueiredo et al., 2018). Banks must peg their operations against possible losses from bad loans.

The **ICE** which depicts the lenders' reward for assuming the performance risk represents the **Interest, Commission, and Extras**. The interest paid on loans defines the cost of the total loan granted to customers (Randall et al., 2001). The interest can be fixed or variable and the higher the speculated risk, the higher the interest, and vice versa (Choudhury, Jones, & Opare-Addo, 2020). Commissions are the costs paid by borrowers to lenders on approved loans and are usually deducted from the gross loan before it is disbursed to borrowers (BoG, 2018; Choudhury et al., 2020). Commission charges by banks on loans are varied. This represents the cost of granting loans to borrowers (BoG, 2019, 2020b). It represents the hidden cost such as legal charges, commissions, and administrative charges which increase credit risk associated with loans granted to borrowers (Tran & Nguyen, 2020). Therefore, the total return to commercial banks constitutes the summation of all the charges including the interest.

From the above, credit risk management is a process of adopting effective practices to control and mitigate credit risk. The process conforms to the standard risk management framework. This framework involves risk identification, risk analysis, monitoring, evaluation, and mitigation of risk. This means the full identification of the cause of the risk, evaluation of the extent of the risk, and deciding on how to mitigate the risk. Therefore, commercial banks must have reliable credit risk identification methods, effective implementation of policies, and adequate strategies to minimise risk exposure reduction. These credit risk management practices must comply with the guidelines of the banking supervision unit of the BoG as described in section 2.1.2.

2.1.2 Role of the Banking Sector Supervision Unit of BoG in Managing Credit Risk

This section elaborates on the role of the banking sector supervision unit of the BoG. The Basel Committee (Basel, 2010, 2013) provides that banking sector supervisors should ensure effective and efficient systems for identifying, measuring, monitoring, and controlling credit risk as part of the overall approach to risk management. The Basel accords recommend that supervisors set limits and procedures to control the risk exposure of banks. The Committee advised supervisors to undertake an individual appraisal of practices used by banks, strategies, procedures, and policies concerning the granting of loans (Basel, 2017). The committee further advised supervisors to set limits to control the risk exposure of banks to mitigate credit losses. Therefore, directives were issued to the Board of Directors in respect of their responsibility to intermittently review credit risk strategies whilst allowing senior management to ensure effective

implementation of policies (Parchimowicz & Spence, 2020). This implies the effective monitoring of credit used in agricultural finance.

The Bank of Ghana requests all banks to nominate risk officers for the coordination of specific measures aimed at controlling the risk exposure of banks (BoG, 2020b). The banking supervision department of the Central Bank of Ghana (BoG, 2020b) is responsible for ensuring that banks have effective and efficient systems of administration. The system enables banks in identifying, measuring, monitoring, and controlling credit risk as part of the approach to overall risk management. It is the responsibility of the banking supervision department to conduct an independent evaluation of the policies, strategies procedures, and practices used by banks in granting credits and how portfolios are managed (Barnor & Odonkor, 2012; BoG, 2020a). The supervision department of the BoG set prudential limits to restrict bank exposure to single borrowers or groups of connected counterparties. It also has the authority to sanction, revoke licenses, and liquidate defunct banks.

A solid credit risk management process in commercial banks serves as the foundation for assessing the creditworthiness of borrowers. Following Choudhury et al. (2020) therefore, credit risk in commercial banks in Ghana could be reduced if the banking sector supervision unit of the central bank of Ghana provides the best policies for effective supervision and monitoring the implementation processes at all stages. Highly risky projects such as agricultural finance should be regularly monitored to ensure that the loans are used for the intended purposes (Serwadda, 2018). The Bank of Ghana requires all banks to nominate risk officers to coordinate the measures instituted to mitigate credit risk exposure (BoG, 2018). Effective implementation of these measures enables commercial banks to reduce credit risk exposure and achieve appreciable financial performance (Le & Diep, 2020). To achieve this, it is imperative that, banks adopt and practice the recommendations of the Basel accords. Section 2.1.3 describes Basel accords in detail.

2.1.3 The Basel Accords and Risk Management

This section assesses the Basel accords and credit risk management protocols. The Committee on Banking Regulations and Supervisory Practices referred to as the Basel Committee on Banking Supervision was established by the central banks of the G10 countries (Italy, Germany, Japan, Belgium, Canada, France, Netherlands, Switzerland, Sweden, United States, and the

United Kingdom) to purposively improve the flexibility of banks against banking crises (Basel, 2013). The committee was formed after Bankhaus Herstatt in West Germany and the Franklin National Bank in the United States collapsed in 1974. The Basel Committee set up internationally accepted standard principles known as the Basel Accords (to cope with various risks in banks (Basel, 2017). Basel I, was introduced in 1988, Basel II in 2004, Basel III in 2009-2010, and Basel IV was recently introduced in 2016 set to be implemented in 2022 (Basel, 2017). The principles and guidelines of the Accords were initially meant for the G10 countries but have now been applied in other developed and developing countries (Al-Tamimi, 2008). According to these principles, banks are required to maintain a prescribed level of capital against operational and other financial risks. Masood and Fry (2012) suggest that the implementation of Basel Accords has a positive impact on risk management and improves financial sustainability by providing methodologies that are sensitive to risk.

According to Al-Tamimi (2008), the Basel Accords improve risk management and decrease instability in both small and big banks. In a study conducted by Lee and Chih (2013) the Basel II represented a genuine revolution and developed uniform standards for capital adequacy as well as the codes of best risk management practices internationally. These codes are designed to improve the integrity and stability of the financial system and to ensure global banking health. Barth, Caprio, and Levine (2013) examined the relationships between a wide range of banking regulations and supervisory practices and their impact on the development, performance, and stability of banks. They found that the severity of capital regulations positively relates to the fiscal development of banks.

The Basel Accords provide suggestions to learn from the crises and take proactive measures to reduce risk-taking to acceptable levels in banks (Couto & Bulhões, 2009; Genest & Brie, 2013). Basel II saw it necessary for banks to have internal rating systems to determine the capital reservation of banks (Couto & Bulhões, 2009). Basel III contains a comprehensive set of reform measures developed by the Basel Committee on Banking Supervision to strengthen regulation, supervision, and risk management within the banking sector (Bunea & Dinu, 2019). According to Mihai (2020), Basel III addresses numerous deficiencies in the pre-crisis regulatory framework and provides a robust banking system that prevents the growth of systemic susceptibilities. Further, the Capital Requirement Directive (CRD) IV was developed (Basel IV) to embody the

implementation of the Basel III accord. The core objective of the new rule (Basel IV) is to reinforce the resilience of the banking sector to absorb economic shocks and at the same time ensuring that banks continue finance growth and economic activities.

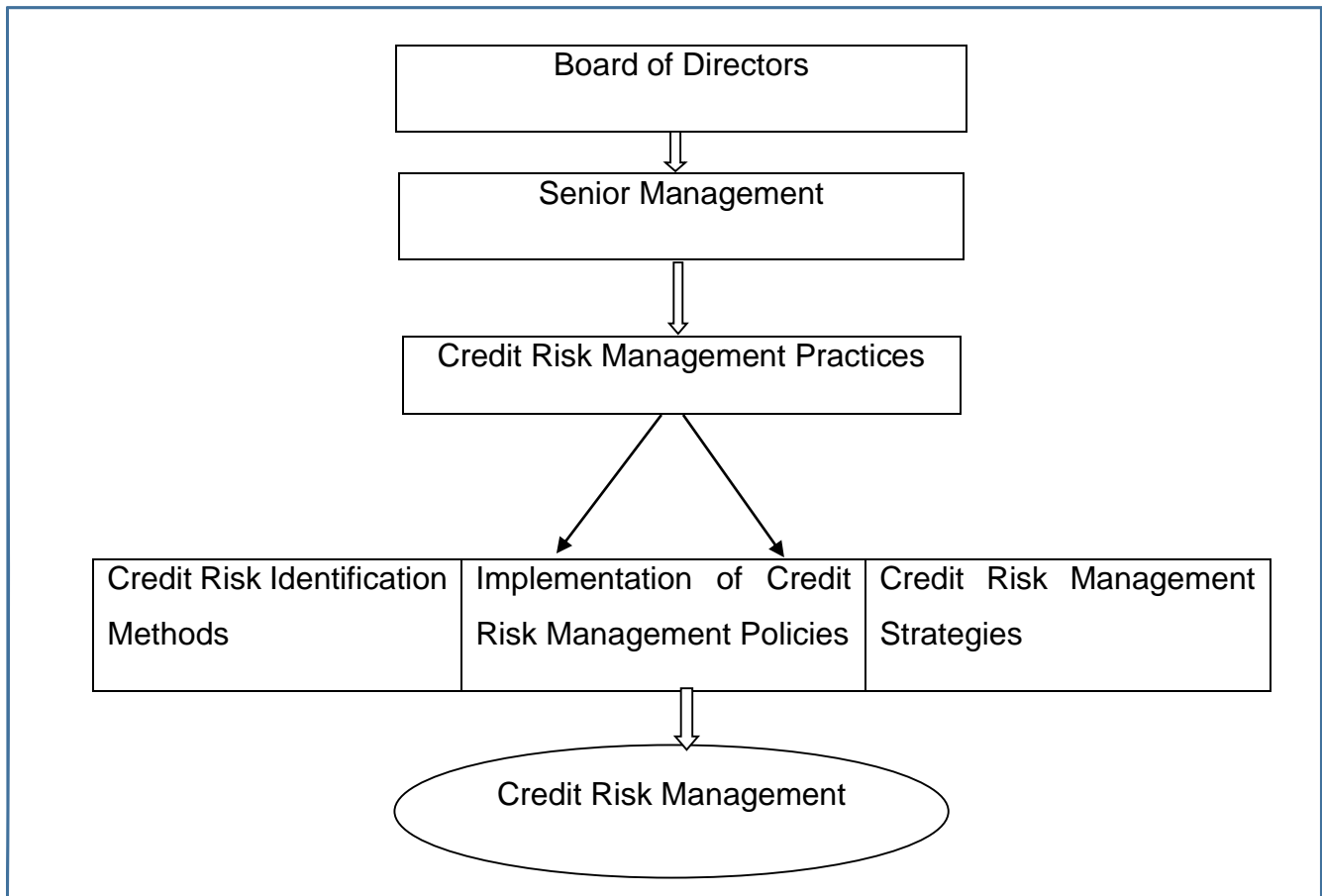
The Capital Requirement Directive (CRD) IV known as the Basel IV stressed capital requirements, supervision, corporate governance, sanctions and counterparty credit risks among others (Meulewaeter & Candelon, 2020; Parchimowicz & Spence, 2020). The Basel IV framework was introduced to complement Basel III and complete the Basel framework on prudential regulations on banking (Parchimowicz & Spence, 2020). Oyetade, Obalade, and Muzindutsi (2020) further indicate that the implementation of Basel IV would have a significant positive impact on the securitisation of commercial banks in South Africa and that higher capital requirement of Basel IV could have no significant impact on securitising banks even though it could potentially protect banks from securitisation exposure. The banking sector has undergone structural transformations and Ghana has so far adopted Basel accords I and II throughout the decision-making processes of banks such as monitoring, loan pricing, management decision process, and credit risk mitigation (Adjirackor, Asare, Asare, Gagakuma, & Kpawul, 2017). The implementation of the Basel accords I and II was to help curb credit risk management challenges, but this problem has not been resolved. It means that there is a need, particularly for the Ghanaian banking system, to strategically design an effective credit risk management conceptual framework to counter credit risk exposure associated with agricultural lending. This study conceptualises a credit risk management framework that minimises credit risk exposure in agricultural finance. This framework is discussed in section 2.2.

2.2 Conceptual Framework

This conceptual framework indicates relations among various components in the management and reduction of credit risk in finance agricultural in commercial banks. The components form the basic foundation in the efficient and effective management of risk in Agricultural finance. These components include the Board and Senior Management, Structure of Organization, Systems, and procedures which should reflect credit risk decisions in line with the identification methods, implementation of policies, and strategies that can be used to minimise credit risks in agricultural lending. The conceptual framework should be applied in all aspects involving credit risk identification methods and implementation of credit risk management policies and the

strategies used to mitigate credit risk in agricultural finance. The framework lays a strong foundation for the understanding of risk management practices in agricultural finance in the Ghana context based on the objectives that guide this study. Figure 1 shows the conceptual framework of the study.

Figure 1: Credit Risk Management Framework



Source: Compiled by the author (2021)

2.2.1 Credit Risk Management Policies and Mitigation Strategies

A critical success factor for commercial banks lies in the realisation of the significance of credit risk management policies and credit risk mitigation strategies. Credit risk management policies and mitigation strategies form the basis for a sound Credit Risk Management system outlining the scope and allocation of commercial banks’ credit facilities and how credit portfolios are managed to range from the origination, appraisal, supervision, and collection of loans from agricultural borrowers (Richard, Chijoriga, Kaijage, Peterson, & Bohman, 2008).

Credit risk management policies and mitigation strategies are key components of the commercial banks' credit risk management process. A clear distinction is made between credit risk management policies and credit risk mitigation strategies in this section. On one hand, Musyoki Danson and Kadubo Adano Salad (2012), explain that credit risk management policies establish the framework for advancing agricultural credits and guide the credit-granting activities of commercial banks. Also, credit risk management policies of commercial banks address agricultural credit-related risk by focusing on the target market (agricultural borrowers in this context), portfolio mix, approval and authorisation processes, responsibilities, duties, and obligations of all parties in the management and control of credit risk. Credit risk management policies must be effectively developed, clearly defined, consistent with relevant regulatory requirements, and effectively implemented in building a reliable credit risk management framework to minimise losses in agricultural finance (Poudel & Prakash, 2012).

On the other hand, credit risk mitigation strategies specify the methodologies and procedures with which risk managers assess, respond to, and monitor the activities of credit risk associated with agricultural lending (Zia Ur Rehman, Noor Muhammad, Bilal Sarwar, & Muhammad AsifRaz, 2019). In this regard, credit risk management strategy provides a coherent approach to identify, assess and manage the credit risk of commercial banks in agricultural finance. Credit risk assessment involves the identification and review of credit-related risk faced by commercial banks (Ho & Yusoff, 2009). Further, Bülbül, Hakenes, and Lambert (2019) argue that credit risk management strategy specifies strategic plans, limitations, and criteria for decision-making influencing credit risk management in commercial banks. It was again posited that; risk management strategy directs commercial banks' view of how risk will be mitigated within a distinct category. To this end, risk management processes in commercial banks must fully involve the board of directors. The role of the board of directors in the credit risk mitigation process is highlighted in section 2.2.2.

2.2.2 Role of Board of Directors in Mitigating Credit Risk of Commercial Banks

The main function of the board of directors is to review the practices of banks that will help reduce risk to a tolerable level (Shungu, Ngirande, & Ndlovu, 2014). The board of directors is responsible for the approval and periodical review of strategies and policies for managing credit risk in commercial banks (Chan, Koh, & Abd Karim, 2016). The strategies and policies should

be comprehensive and conform to the banks' risk level of tolerance and profitability anticipated at a given level of risk. The Basel Committee on Banking Supervision (Basel, 2015) developed guidelines for corporate governance principles for banks. The committee recommends the board of directors must ensure that risk management, internal audit functions, and compliance are properly effective, positioned, adequately staffed, well-resourced, and independently carry out their roles objectively. This suggests that the board must review regularly, key policies and controls with senior management as well as credit risk management units, compliance, and internal audit functions in identifying and addressing significant risk exposure in commercial banks. Based on the above, credit risk and issues that need improvement are determined and monitored.

The board of directors must ensure that senior management can manage credit-related activities undertaken by banks within the strategies, policies, and level of tolerances approved by the board (Shungu et al., 2014). The board should also regularly approve the credit criteria of the bank within the credit policy statement (Chan et al., 2016; Switzer & Wang, 2013). Also, how banks organise their credit-granting, independent review of credit-granting and management functions of the portfolio are approved by the board (Boateng et al., 2019; Pathan, 2009). To avoid conflict of interest, board members should not override the credit-granting and monitoring processes of banks (Baklouti, Gautier, & Affes, 2016). Therefore, it is the board's responsibility to ensure that banks' remuneration policies do not contradict credit risk management strategies (Pathan, 2009). As a result, a remuneration policy that rewards unacceptable unethical behaviour involving short-term profits by deviating from the credit policies or exceeding certain established limits weakens the processes of banks' credits (Chan et al., 2016). The board of directors must ensure that senior management carries out and implement strategic plans in minimising credit risk. Senior management is therefore expected to perform its roles effectively as discussed in section 2.2.3.

2.2.3 Role of Senior Management in Mitigating Credit Risk of Commercial Banks

Basel (2015) suggested the board appoint the Chief Executive officer and other key senior management personnel. The Committee adds that the board should provide oversight of senior management and hold members of senior management accountable for their actions or inactions and institute probable consequences (such as dismissal) if senior management actions are not

commensurate with the performance expectations of the board. This involves adherence to the values of banks, risk appetite, and risk culture (Mačerinskienė, Ivaškevičiūtė, & Railienė, 2014).

Senior management is responsible for the implementation of credit risk management decisions approved by the board of directors (Asfaw & Veni, 2015). Therefore, senior management develops policies and procedures for the identification, measuring, monitoring, evaluating, and controlling of credit risk in banks (Boateng et al., 2019). The policies and procedures enable the banks to address credit risk management challenges in all their operations at all portfolio levels (Ndoka & Islami, 2016). The senior management ensures that decisions taken conform to the established strategies, development, and implementation of written procedures and ensuring that responsibilities for review as well as approval of loans are properly assigned (Boateng et al., 2019). Senior management must also conduct an independent internal appraisal of banks; credit-granting and functions of management. The foundation for banking operations is the design and effective implementation of procedures and policies relating to the identification, measuring, monitoring, and controlling of credit risk (Asfaw & Veni, 2015). The credit policies establish the framework for lending and serve as a guide to the credit-granting operations of banks (Wachira, 2017). The policies should be efficient in addressing the target markets, portfolio mix, price, and non-price items, limit structures, approval authorities, exception reporting (Asfaw & Veni, 2015). Again, the policies should be effectively defined and consistent with banking practices and the regulatory environment. This implies that policies should be regularly evaluated to ensure checks and balances.

Checks and balances should be effectively employed in all credit decisions by senior management to mitigate credit loss (Anghelache & Bodo, 2018). The available policies should conform to both internal and external factors, considering the market position of the banks, area of trade, size of the bank, capabilities of staff, technology, and macro-economic indicators to enable banks to maintain a solid foundation of credit granting standards, monitor and control credit risk, evaluate potential business opportunities and identify problem credits for administration (Lalon, 2015). It is required and appropriate that risk managers have rigorous skills and knowledge to undertake risk management functions and apply solid practices in identifying the methods and their applications, implementation of policies and strategies for controlling risk in agricultural finance (Kodithuwakku, 2015). This framework is important for this

study because it explains the risk management practices in detail. These practices can be adopted by commercial banks to minimise credit risk exposure in agricultural finance (Wang, Wang, & Wang, 2017). The framework also suggests how organisations can successfully, efficiently, and effectively assess an entity's risks with an appropriate implementation approach. The practices are explained in detail in the empirical review in Chapter 3. The practices must conform to acceptable norms and basic theories. In the context of this study, the theories are discussed in section 2.3.

2.3. Theoretical Framework

The risk management practices of banks are guided by several theories. Some of the theories of credit risk management discussed in this section include the Economic Utility Theory; Liquidity Theory of Risk; Tax Theory of Credit Risk; Adverse Selection Theory; and Credit Referencing Theory.

2.3.1 Economic Utility Theory

The utility theory is one of the early theories propounded by Bernoulli (1954) as one of the cornerstones of current economic science and is possibly the most used for human choice under uncertain conditions and risk. The theory posits that the desires and economic opportunities of individuals influence the demand for goods and services. The economic utility theory shows how risky decisions are made. The theory posits that market participants seek to satisfy their interests to achieve maximum benefits which are referred to as utility (Zafar, Khan, Roberts, & Zafar, 2015). The theory assumes that individuals and entities have limited resources to achieve maximum satisfaction and they constantly have to make choices on how to use their resources to minimise costs and maximise benefits. Just and Peterson (2003), argue that the utility theory has been analysed in agricultural literature since 1970. Just and Peterson (2003), indicated that utility is perceived as a real or imaginary product that satisfies the need of man and that, risky decisions are based on the utility theory. The keynote of this theory is that commercial banks must first calculate the probability of the potential outcomes and their results in agricultural finance (Chandio, Jiang, Wei, Rehman, & Liu, 2017; Olutunla & Obamuyi, 2008).

In Ghana, agricultural endeavours are quite risky due to the methods employed. The utility theory implies that commercial banks have limited resources to achieve maximum satisfaction and they constantly have to make choices of how to use their resources in their decisions to grant loans

to agricultural borrowers. The aforementioned theory again implies that agricultural borrowers want more credits rather than less even though lending to the agricultural sector is characterised by high credit risk. The agricultural borrowers are therefore interested in reducing costs and increasing benefits (Rahji & Fakayode, 2009).

Cather (2010) posits that utility theory is an integral part of risk and attitudes towards it. This attests to the fact that whilst commercial banks contemplate on how to reduce cost and increase profit in lending to the agricultural borrowers, the borrowers, on the other hand, anticipate more credits from the banks to achieve their satisfaction. This theory implies that agricultural borrowers are approximately risk-neutral when credit stakes are small. Therefore, before commercial banks engage in agricultural finance in an emerging economy like Ghana, it is prudent to carefully consider the risks involved and make the best choice. Ghanaian commercial banks must choose the alternative that offers the highest utility and minimizes credit risk in agricultural lending. By implication, where the sources of income for the agricultural borrower are numerous, choosing the best alternatives that offer the highest utility in agricultural lending is limited. This accounts for why this method is not most appropriate in this study. Simply put, the decision of agricultural borrowers to accept or reject a credit depends on the ability to access more sources of finance discussed in section 2.3.2 under the tax theory of credit risk.

2.3.2 Tax Theory of Credit Risk

This section examines the tax theory of risk that is based on the ability to access more sources of finance and therefore to accept or reject a credit (Thakor, 2016). The theory postulates that the tax-deductibility of interest on debt impacts the funding decision of banks. The theory further indicates that the tax effects should be considered in comparing the actual trade cost of credit with other options. The theory insists that lenders and borrowers can be classified into different tax brackets in assessing sources of finance in which they have different borrowing costs since their interests are allowable deductions (Brick and Fung, 1984). In support of this argument, Brick and Fung (1984) argue that businesses in higher tax brackets advance more credit than those in low tax brackets in New Jersey. Simply put, businesses in higher tax brackets cheaply borrow more and directly from the banks than those in lower tax brackets. Repayment is required whether or not a business is in either of the tax brackets. In business terms, repayments could be made immediately or deferred to the future in which a deferred cost component such as

interest is attached (Gekara, 2017). In the tax theory, the deferred cost component represents the interest, which is considered in ascertaining the real and total cost of the credit to borrowers as well as its associated credit risk. The indirect effect, which is novel to this study, is that high credit risk, in turn, increases the cost of lending. In principle, this leads banks to cut down on investment in lending. Put in another way, the higher credit risk and its associated cost lead banks to lose their tax shield that makes agricultural finance cheaper.

The tax theory of credit risk implies that businesses must consider and investigate the real cost of borrowing to reduce higher rates of defaults and hence credit risk in agricultural lending. As a result, commercial banks in the agricultural value chain finance are obliged to consider different finance options to choose the most economically viable option to save costs and reduce loan losses (Gupta, Wilson, Gregoriou, & Healy, 2014). The tax effects should be considered by commercial banks to compare to the other sources of finance (Thakor, 2016). This theory implies that only the agricultural borrowers in higher tax brackets cheaply borrow more and directly from the banks. This implication is not the most appropriate in agricultural finance by Ghanaian commercial banks as funding is inadequate because of the high credit risk associated with agricultural lending. Also, agricultural borrowers generally do not have available options to choose from. In this study, therefore, liquidity theory, adverse selection theory, and the credit referencing theory explained in section 2.3.3., 2.3.4 and 2.3.5 respectively, are deemed appropriate and these are subsequently discussed in detail.

2.3.3 Liquidity Theory of Credit Risk

This section evaluates the applicability of the liquidity theory of credit risk. Liquidity in this context is the ability and certainty to convert an asset back into cash within the shortest possible time (Ejoh, Okpa, & Egbe, 2014). The liquidity theory has a strong connection with credit risk resulting from borrowers' defaults which reduces cash flow and affects liquidity (Abdelaziz, Rim, & Helmi, 2020). The liquidity theory was first proposed by Emery (1984). This theory postulates that the offer of trade credit can make up for the decline of credit from lending institutions for financially inhibited firms (Emery, 1984). The theory assumes that firms that ration credit use more trade credit than firms with normal access to financial institutions. The theory also posits that (1) cash is observable and verifiable; (2) the riskiness of cash is invariant to banks decisions as to whether or not to invest more resources in risk mitigation in non-cash asset portfolio of risky assets held

by banks; (3) keeping adequate cash in advance saves on cost of liquidation (Acharya & Naqvi, 2012; Calomiris, Heider, & Hoerova, 2015). Generally, the theory encourages banks to maintain certain levels of cash and cash equivalents for business transaction needs, to meet contingencies, and to take advantage of profitable investment opportunities (Abbas et al., 2020; Kim et al., 1998).

The theory implies that banks must hold a large number of liquid assets against possible demand or payment cushion of readily marketable short-term liquid assets against unforeseen circumstances (Ejoh et al., 2014). Lower liquidity negatively impacts agricultural lending (Maloba & Alhassan, 2019). This calls for the need for banks with good liquidity positions or access to the capital market to finance those that have inadequate liquidity to provide agricultural credit supply. To support the assertion, Gekara (2017) argues that liquidity is tightened in the economy to ensure the sustainability of banks to advance more credits to their borrowers. This implies that, when liquidity is tightened in commercial banks, sustainability is created and agricultural borrowers are assured of more trade credits. Liquidity management in commercial banks is therefore inevitable. Liquidity management in this context is the act of keeping adequate funds and raising funds quickly from the market to satisfy depositors' demands with the view of maintaining public confidence (BoG, 2020). BoG (2020) directed commercial banks to build up adequate liquidity to advance trade credit to agricultural borrowers. The reason for effective credit risk management practices in commercial banks is to ensure that there is adequate liquidity for transactional purposes, speculative and precautionary demands for money (Abbas, Iqbal & Aziz, 2019). This indicates that commercial banks can only lend to agricultural borrowers when there is adequate liquidity. This theory, therefore, implies the need for commercial banks to effectively mitigate credit risk exposure in agricultural finance to increase liquidity and create adequate trade credit for agribusiness activities. Adequate liquidity implies borrowers are repaying their loans without having to pay out of their own pockets as discussed in 2.3.4.

2.3.4 Adverse Selection Theory

The adverse selection theory is the next for discussion in the context of this study. The adverse selection theory was originated by Stiglitz and Weiss (1981), underpinned by two main assumptions. Firstly, lenders cannot differentiate between the appetite of borrowers and risk levels (Stiglitz & Weiss, 1981). Secondly, credit contracts are subject to limitations (Stiglitz &

Weiss, 1981). That is; where the debt responsibilities are more than the business or project proceeds, borrowers have no responsibility to pay out of their own pockets (Ahlin & Waters, 2016). This assertion does not extend to borrowers who voluntarily default but presumes that borrowers pay back loans if they have the means to do so (Guttman, 2008). The limited liability of borrowers implies that commercial banks must critically conduct due diligence works before advancing credit to agricultural borrowers in the agricultural value chain finance. This is because commercial banks bear all the downside risks in credit losses (Cressy & Toivanen, 2001).

Significantly, all gains above the loan repayment obligation accrue to the agricultural borrowers, and hence increasing the interest rate affects the gains (profits) of low-risk borrowers (because they anticipate lower return) disproportionately, causing them to drop out of the application group (Ahlin & Waters; Kusi & Opoku-Mensah, 2018). In the adverse selection theory, an increase in interest rates might not ensure that all applicants for loans or credit secure credit, especially in times where loanable funds are inadequate (An, Deng, & Gabriel, 2011). Borrowers with greater wealth may put in collateral to guarantee cheaper credit and to serve as an incentive to work hard and generate more revenue (Muhammad, Khan, & Xu, 2018). Muhammad et al., (2018) further advised banks to collaborate with risk-sharing systems in an attempt to minimize credit risk associated with agricultural finance in commercial banks. In another instance, it was argued that because lenders such as commercial banks desire to overvalue credit risk differently from agricultural borrowers, the interest rates are kept below equilibrium by the commercial banks in an attempt to ration borrowers to achieve a better structure to lower risk in their portfolio of loans (Jappelli & Pagano, 2002). In essence, credit demands in the credit market will be more than the supply since the interest rates fall below normal equilibrium and might even continue during competition and flexible rates of interest (Popović, Janković, & Žaklina, 2018). The adverse selection theory does not guarantee that the loan applicant secures credit when the interest is high, particularly at a time where loanable funds are insufficient (Blazy & Weill, 2013; Vallee & Zeng, 2019). Collateral is required from borrowers with substantial wealth to guarantee. Borrowers with greater wealth may put in collateral to guarantee low-cost credit and to also serve as a great incentive to work harder and generate sufficient income (Jappelli & Pagano, 2002). Therefore, considering the differences in assets among agricultural borrowers, it may result in constant poverty where the borrowers may not be able to repay their loans resulting in high credit risk exposure among commercial banks.

Through the exchange of credit information among commercial banks, the knowledge base of the banks about the characteristics and behaviour of loan applicants will be improved (Kusi et al., 2017; Kusi Opoku-Mensah, 2018). Theoretically, reducing the asymmetry of information by the use of credit information sharing among commercial banks reduces the probability of the banks selecting possible bad borrowers in agricultural lending (Al-Muharrami & Hardy, 2014). This creates incentives for borrowers to repay their loans without default. A study conducted on information sharing and credit (Brown, Japelli, & Pagano, 2009) argued that information sharing by lenders about their borrowers' behaviour and characteristics reduces the adverse selection of loan applicants among eastern European banks. Kusi-Baah and Opoku-Mensah (2018) indicated that, by sharing information on potential agricultural borrowers, an incentive is also created for performance in the interest of commercial banks. This implies that borrowers' credit information sharing among commercial banks also increases the motivation level of borrowers to repay loans, especially in environments where the systems make it very difficult for banks to enforce credit contracts. Consequently, agricultural borrowers would repay their loans since they would not want commercial banks to blacklist them and cause a subsequent denial of loan facilities for agricultural activities. The adverse selection theory implies that agricultural borrowers cannot repay commercial banks out of their own pockets where the loans and interest responsibilities are more than the income generated from their agribusinesses. This means that the debt responsibility of agricultural borrowers is limited to the agribusiness proceeds and commercial banks must prudently adopt the best practices to minimize credit risk exposure in agricultural finance. In adopting the best practice, commercial banks must share all available information of the agricultural borrowers and analyse their creditworthiness. Credit referencing bureaus are expected to provide adequate information about borrowers and are subsequently discussed in section 2.3.5.

2.3.5 Credit Referencing Theory

The last theory discussed in this study is the credit referencing theory. Credit referencing refers to the ability of a firm to provide all available information about individuals' track credit records or history. Credit referencing theory highlights information sharing which was initiated by Freimer and Gordon (1965) and later extended by Stiglitz and Weiss (1981). The theory states that credit markets do not have adequate, complete, and reliable credit information on individuals (asymmetry of information). The theory further indicates that lenders have no means of verifying

and separating good borrowers from bad ones to avoid default. This theory stipulates that borrowers or credit applicants tend to provide incomplete or false information to access credits from lenders since lenders do not have adequate means of verifying and tracking borrowers' information (Dawney, Kirwan, & Walker, 2020). The theory stresses that the lack of comprehensive and adequate information of clients creates loan losses and leads to credit risk in the credit market. To provide adequate information and loan losses, credit bureau institutions are established. A credit bureau institution is an institution that collates information from creditors and available public sources on borrowers' credit history or tracks records (Kusi et al., 2016). Simply put, credit bureaus are organisations that gather data from banks and non-banks, check the accuracy of the data collected, and then combined all the data in a meaningful way to generate a credit report or information. This is achieved by asking for references from known parties, credit register assessment, legal status evaluation knowing responsibilities of individuals in charge of managing counterparty risk to know the customers they are dealing with prevent banks from being used for laundry activities (Gichimu, 2013; Kessey, 2015; Otwori, 2013). Knowing your customer (KYC) can be enhanced by a credit referencing bureau (Tchamyou, 2019). The credit referencing bureau serves as a credit information repository that collates creditors' information to provide banks with credit details of customers in mitigating credit risk (Kusi et al., 2016). This enables lenders such as commercial banks to gather enough information on agricultural borrowers and provides a reliable way of KYC assessment to mitigate credit risk exposure (Kessey, 2015). For a credit information system to be effective, there should be a reliable national identification system for individuals; an adequate regulatory or policy structure; a framework that supports information sharing, and a system that protects clients' privacy in Kenya (Saruni & Koori, 2020). The purpose of credit referencing theory is to expose any single borrower from a wide range of credit providers through credit bureau institutions.

To establish a strong ground for the institution of credit referencing, the Ghanaian parliament has formulated the Credit Reporting Act, 2007 (Act 726) to regulate and guide the credit information of borrowers. Commercial banks can know the creditworthiness of their agricultural borrowers by seeking references from other parties, credit register assessment, and evaluation of legislative requirements to gain information on individuals responsible for managing counterparty credit risks (Mole & Namusonge, 2016). The credit referencing bureau is the repository of customers' credit information which can be utilised by commercial banks to collate

agricultural borrowers' credit information. Therefore, assessing the purpose of credits given by commercial banks to agricultural borrowers is very significant to the banks to verify the legality of transactions regarding customers and available regulatory requirements to mitigate against potential credit risk exposure in agricultural finance (Huang, 2018; Kessey, 2015). The assessment of creditors credit information involves both financial information such as cash flow and profitability; and non-financial information including borrowers' character; experience; credit history; the purpose and structure of the transaction for which approval is sought (Nasieku & Ngugi, 2016); and credit risk management strategies among others which provide data on counterparties' risk profile and management principles (Basel, 2010; Kessey, 2015). Therefore, commercial banks' knowledge of their agricultural borrowers is critical in minimising credit risk (Moti, Masinde, Mugenda, & Sindani, 2012). This implies that commercial banks should develop a familiar relationship with agricultural borrowers and be very confident that the agribusiness entities are sound, reputable, and creditworthy before supplying agricultural credits (Basel, 2010). Agricultural credit supply in Ghana is elaborated in section 2.4.

2.4 Overview of Agricultural Credit Supply in Ghana

This section provides a brief synopsis of the agricultural credit supply in Ghana. It is significant to present an overview of financial institutions in this section as they provide the main source of agricultural credit supply in Ghana. BoG (2021), Marina (2015), and Abdallah (2016) define agricultural credit supply as the present and temporary transfer of purchasing power from a person who owns it to another who is willing and able to repay at a specified future date with costs. Agricultural credit supply can either be in a form of physical cash supply or kinds such as the direct provision of inputs and equipment such as fertilizers, seeds, seedlings, tractors, harvesters, incubators, and expert services by the banks (Oladeebo & Oladeebo, 2008). According to Amponsah (2017), the agricultural credit supply in Ghana is the responsibility of the financial institutions, especially the banks. Financial Institutions for agricultural credit supply are grouped into three main categories; namely: Informal Financial Institutions, Semi-Formal Financial Institutions, and Formal Financial Institutions (Amponsah, 2017). These institutions are subsequently elucidated in Section 2.4.1.

2.4.1. Agricultural Credit Supply by Informal Financial Institutions

The informal agricultural credit supply plays a significant role in agricultural finance in Ghana. The informal financial sector consists of moneylenders, popularly known as micro-credit, traders, and the traditional 'Susu' system. Moneylenders are informal lenders who provide agricultural credit supply to individuals and small households such as family members, friends, and neighbours (Lee & Perso, 2016; Madestam, 2014). Madestam (2014) further argues that money lenders have a monitoring advantage on agricultural credit supplies over banks since they possess superior knowledge about local agricultural borrowers. These moneylenders usually turn to the banks when additional agricultural credit supply is required to meet agricultural borrowers' needs. Traders have also been a major contributor to agricultural supply in rural Ghanaian communities. In limited rural areas and urban markets, traders provide agricultural credit supplies in the form of inputs on suppliers' credit or advances against future purchases of crops. Traders do not usually require collateral for agricultural credit supplies, but prefer an agreement with farmers to sell their crops over an agreed period (Madestam 2014). According to Alabi, Alabi, and Ahiawodzi (2007) and Abdallah (2016), the 'Susu' system is a traditional savings collection system that also provides agricultural credit supplies. 'Susu' was thought to have originated in Nigeria and was introduced in Ghana in the early twentieth century. Under the 'susu' system, farmers and other small-scale agribusiness men periodically deposit money with 'Susu operators against which they can borrow for agricultural activities.

2.4.2 Agricultural Credit Supply in Semi-Formal Financial Institutions

In addition to the informal financial institutions described in section 2.4.1, the semi-formal financial institutions also provide another source of agricultural credit supply. The semi-formal sector agricultural credit supply of Ghana is made up of savings and loans (also known as Microfinance Institutions); credit unions; and Non-Governmental Organisations (NGOs) (Amponsah, 2017). These microfinance institutions provide financial services including agricultural credit supply to poor agricultural borrowers who particularly do not have access to credits from the formal financial institutions (Assefa, Hermes, & Meesters, 2013). Microfinance institutions are subject to credit risk assessment and loan repayment problems as credit agricultural borrowers usually have little or no collateral (Wersland & Strom, 2009). Second, credit unions are establishments that give savings and agricultural credit services exclusively to their members. Lastly, NGOs-MFIs are the most common semi-formal financial institutions in

Ghana (BoG, 2020a). The NGOs may use funds from commercial banks for further provision of agricultural credit supply to agricultural borrowers who cannot access credits from the formal financial institutions (Anku-Tsedde, 2014).

2.4.3 Agricultural Credit Supply in Formal Financial Institutions

Another source of agricultural credit supply is the formal financial institutions. Formal financial institutions provide an organised source of agricultural credit supply to agricultural borrowers (Shuaibu & Nchake, 2021). This includes an assessment of the ability of agricultural borrowers to repay principal with interest, cashflow of the agricultural borrowers, collateral requirement, borrowers' capital requirement as well as the capacity of the agricultural borrowers (Maloba & Alhassan, 2019). Agricultural credit supply informal financial institutions have benefits and challenges. Some of the benefits are that it provides loans to improve the agricultural borrowers' production assets: serves as the main source of working capital for agricultural borrowers; and increases the capacity of agricultural borrowers (Rozhkova, 2021). On the other hand, it does not favour small-scale agribusiness enterprises and individuals who have no collateral or do not have proper documentation to secure agricultural credit supply (Sher, Mazhar, Azadi, & Lin, 2021). In Ghana, the formal financial sector is mostly made up of Commercial Banks such as Prudential Bank Ltd, GCB Bank, ADB Bank, and Stanbic Bank Ghana Ltd just to mention a few (BoG, 2019). The BoG (2019) indicated that formal financial institutions also involve rural and Community Banks such as the ARB Apex Bank. As per the Ghana Companies Code 2019 (Act 992), the Banking Act 2007, and the Bank of Ghana directives (BoG, 2019), the formal financial institutions are well regulated to operate as limited entities in their banking operations and activities. Therefore, Formal Financial Institutions are incorporated under the Companies Code 1963 (Act 179) as amended by the Companies code 2019, Act 992 of the Republic of Ghana, which gives them legal identities as limited liability companies and is also licensed by the BoG under either the Banking Act 2007 or the Financial Institutions (Non-Banking) Act 930. It implies that to operate as a commercial bank in Ghana, the entity must first register with the registrar of companies under the companies code 2019, Act 992 after the application to the Bank of Ghana for the license to practice as legal compliance is noted to be very relevant (Chiu, 2017). As a result, commercial banks must meet the regulatory and statutory requirements before they are mandated the authority to provide credits supply for agribusinesses (Awunyo-Victor, Al-Hassan, Sarpong, & Egyir, 2014).

2.4.4 The Role of Commercial Banks in Agricultural Credit Supply

This section highlights the roles of commercial banks in agricultural lending. Commercial banks play significant roles in agricultural lending (Borisov, Qerimi, & Behluli, 2020). In some jurisdictions such as the USA, UK, China, and Japan, commercial banks provide credit services to agribusinesses and expect regular repayments of principal and interest on loans granted for agricultural activities to reduce credit risk (Bayyoud & Sayyad, 2015; Boadi, Dana, Mertens, & Mensah, 2017). Also, commercial banks provide credits to businesses and individuals involved in the agricultural value chain finance (Abata, 2014; Sinha, 2019). Commercial banks must prudently manage the loans granted to agricultural borrowers to minimize credit losses, improve the agricultural sector activities and also enhance banks' performance (Barros, Ferreira, & Williams, 2007; Delis, Koutsomanoli-Fillipaki, Staikouras, & Katerina, 2009). In addition, commercial banks possess almost similar features in their operations in mitigating credit risks in agricultural finance (Vidyarthi & Tiwari, 2019). In other jurisdictions such as Nigeria, the provision of agricultural credit supply by commercial banks for sustainable agricultural development cannot be overemphasised (Okafor, 2020). Similarly, the Banking Act, 2004 (Act 673) as amended by Banking Act, 2007 (Act 738) of the Republic of Ghana referred to commercial banks as those formal financial institutions that provide banking services to small, medium and large entities and agricultural credit supply. Stating in another argument, Ghanaian commercial banks are presented as formal financial institutions that provide a wide range of services including the provision of agricultural credit supply to agribusinesses (Awunyo-Victor et al., 2014). To finance agribusinesses, Ghanaian commercial banks use deposits from savers and make these deposits available to agricultural borrowers as loans where regular repayments within a certain time frame are expected (Boahene, Dasah, & Agyei, 2012). The Banks and Specialised Deposit-Taking Institutions Act, 2016, Act, 930, requires commercial banks to operate as limited liability³ companies to fully operate and provide agricultural credit supply.

Commercial banks play various roles in credit granting as indicated by the Bank of Ghana (BoG, 2019). Commercial banks accept deposits from clients and these deposits are not allowed to keep idle (Liu, Sun, Yang, & Wu, 2020). Consequently, the balance of cash with commercial

³ Limited Liability companies are those companies in which the liabilities of members are limited to the amount of unpaid shares in the company in which they hold the shares in the event of winding up or when the company falls into liquidation, Companies code 2019, (Act. 992)

banks is given as loans or credits to needy borrowers in the agricultural value chain, after keeping a required reserve of 400 million Ghana Cedis in the case of Ghana (BoG, 2020b), and interests are charged which represent the main source of income for commercial banks (Wood & Skinner, 2018). Foremost, commercial banks provide cash credit to businesses, including agricultural activities indicated by the BoG and Act, 930. The cash credits for agricultural activities represent the loans granted to the borrowers secured by assets such as bonds, stocks, shares, among others depending on the Cashflow of the borrowers (Chandio et al., 2017; Tran & Nguyen, 2020). A credit limit is set and the borrower withdraws any amount within the credit limit with interest charged on the amount withdrawn (Kodithuwakku, 2015). Secondly, commercial banks also provide demand loans stipulated in Act 930. These are loans that can be recalled at any time by commercial banks (Maggi & Guida, 2011). For demand loans, the amount is credited to the borrowers' account and interest is charged or chargeable on the amount of credit to the borrowers' account (Kwan, 2006). Thirdly, commercial banks also offer short-term personal loans to borrowers against collateral securities (Act, 930). Short-term personal loans are credited to the borrowers' accounts and borrowers can withdraw the money from their accounts for agricultural activities (Taher & Saeed, 2020). Borrowers are charged annual interest on the entire loan payable monthly (Chandio et al., 2017).

Also, commercial banks provide overdraft facilities to agricultural borrowers (BoG, 2020b). Commercial banks sometimes allow entities and individuals in the agribusiness to overdraw their current accounts for agricultural activities up to a limited amount agreed between the parties (Serwadda, 2018). This facility is usually granted to trusted customers within a stipulated period. However, customers are charged interest on the overdrawn account (Ali, Eldaw, Alsmadi, & Almarashdeh, 2019). Finally, commercial banks also provide money creation services (Act, 930). To create money, statistics relating to trade, industry, and commerce are collected, and published by commercial banks and advise agricultural borrowers on financial matters (Ábel, Lehmann, & Tapaszt, 2016; McLeay, Radia, & Thomas, 2014). Because of these special services, commercial banks attract deposits from the public and their clients and the deposits are given out as loans to borrowers in the agricultural value chain finance (Yaseen & Qirem, 2018). The loans offered by commercial banks are, most of the time, more than the deposits received and generate more income from interest charges which leads to value creation (Yaseen & Qirem, 2018).

However, commercial banks in Ghana have been faced with high credit risk exposure in agricultural lending. This conundrum has resulted in limited access to credit facilities for agricultural value chain borrowers (Choudhury et al., 2020). Limited access to agricultural credits commercial banks as a result of credit losses is a major challenge in developing countries and Ghana is no exception (Tchamyou, 2019; Weber & Musshoff, 2017) further indicate that because of the high risk of loan default, financial institutions are reluctant to provide adequate credit to agricultural borrowers. Choudhury et al. (2020), argued that if credit risk can be identified and measured using scientific methods, banks and prospective borrowers will have an opportunity to minimize credit risk and positively influence the outcome. Credit risk management is therefore a core management technique that results in the readiness of management to engage in practices that have low levels of risk associated with agricultural lending (Jokivuolle & Peura, 2010).

2.5 Chapter Summary

The chapter commenced with the description of basic concepts and credit risk management in agricultural lending. Because lending constitutes the main source of income for commercial banks, credit risk is inevitable. Commercial banks have adopted a judgmental template CAMPARI and ICE described in this chapter to provide consistency in reporting and identify credit risk associated with agricultural lending to minimize credit risk exposure. To analyse counterparty credit risk, banks have to identify the purpose of credit. Adding, identifying, and assessment of the repayment sources of loans is also a major tool for analysing the credit risk of customers of banks. The capacity of borrowers to repay is measured by the identification of repayment sources, and critically reviewing the future cashflow from the identified sources to ensure that it is enough to meet borrowers' needs and help generate enough cash flows from the core business to repay debt, pay a competitive return to shareholders or owners and replace long term operating assets. The banking sector supervision department of Ghana provides systems for identifying, evaluating, and monitoring credit risk as part of the overall approach to mitigating credit risk exposure in agricultural finance. The Basel accords I, II, III, and IV, provide suggestions to improve risk management and decrease instability in commercial banks with the core objective to minimize credit losses (Basel, 2017). Also, the conceptual framework provides a pictographic assessment for risk management practices appropriate for the board of directors and senior management to mitigate credit risk exposure in commercial banks. Five credit risk

management theories: Economic Utility Theory; Liquidity Theory of Risk; Tax Theory of Credit Risk; Adverse Selection Theory; and Credit Referencing Theory were discussed. The study develops and focuses on two core theories, namely Adverse Selection Theory; and Credit Referencing Theory because they provide the conceptual direction for effective credit risk management practices of commercial banks in agricultural finance. The adverse selection theory provides that borrowers have no responsibility to pay for credit from their own pockets where the debt responsibilities exceed the projected proceeds. The credit referencing theory argues on the provision of credit information of borrowers to lenders so that the lenders have adequate information about borrowers before credit is advanced. Consequently, this generates controversy among authors, particularly where most of the borrowers in the agricultural sector are informal and their credit history does not exist in the credit bureau institutions in Ghana. To this end, borrowers' repayment capacity is measured by identifying and assessing the source of repayment whilst reviewing the future cash flow of the borrowers to ensure that borrowers have the repayment capacity. The chapter further discussed financial institutions and agricultural credits. These institutions were grouped into informal, semi-formal, and formal. Informal financial institutions consist of moneylenders, traders, family members, friends, neighbours, and the traditional 'susu' systems and are not registered with or regulated by the companies' code 2019, Act 992. The semi-formal financial institutions comprise savings and loans, credit unions, and NGOs. The formal financial institutions, on the other hand, comprise commercial banks and rural and community banks. Formal financial institutions are incorporated and regulated by the Bank of Ghana. Commercial banks as formal financial institutions must comply with the Banking Act, 2004, Act 673 in the granting of loans for agricultural purposes to minimize credit risk. The subsequent chapter presents the review of empirical studies on credit risk identification methods, implementation of credit risk management policies, and credit risk management strategies used in commercial banks in mitigating credit risk.

CHAPTER THREE

EMPIRICAL LITERATURE REVIEW

3.1 Introduction

This chapter reviews the studies that tested and evaluated the theories discussed previous Chapter Two. The empirical studies covered credit risk management practices used by Ghanaian commercial banks to mitigate credit risk associated with agricultural lending. The credit risk management practices discussed in this chapter involve credit risk identification methods, the effectiveness of the implementation of credit risk management policies, and credit risk mitigation strategies adopted by commercial banks to minimize credit risk in agricultural lending. First, the review provides alternatives on banks' decisions to manage the credit associated with agricultural finance. Second, the empirical review provides a comprehensive approach to credit risk management and the long-term success of banks in agricultural lending. Third, the empirical review identifies specific credit risk management practices that may differ among banks and provide a comprehensive credit risk management programme to address challenges in agricultural lending. This review eliminates duplication, thereby offering a clear understanding of the existing knowledge about the nature of credit risk and risk management practices in commercial banks. Lastly, the empirical review opens up further discussion on the need for banks to adopt the best risk identification methods, effective implementation approaches, and the best strategies to mitigate credit risk. This chapter discusses the scope of risk identification methods, the effectiveness of the implementation of credit risk management policies, and credit risk management strategies adopted by Ghanaian commercial banks to mitigate credit risk in agricultural lending. The chapter starts with the empirical studies on the nature of credit risk described in section 3.1; empirical studies on credit risk identification methods indicated in section 3.2; empirical studies on the effectiveness of the implementation of credit risk management policies detailed in section 3.3; empirical studies on the effectiveness of credit risk mitigation strategies in section 3.4; and also provides a summary in section 3.5.

3.1.1 Empirical Studies on the Nature of Credit Risk

This section introduces the general nature of credit risk and its management. Credit risk management is a complex multidimensional problem and requires different quantitative and qualitative approaches to fully identify, assess and effectively mitigate credit risk among banks. Switzer and Wang (2013) studied the significance of credit risk management (CRM) of rural commercial banks in China using qualitative and case study approaches. The study found that rural commercial banks in China were highly exposed to credit risk associated with farm-related loans.

In a similar vein, a study conducted on credit risk and internationalisation of SMEs in Turkey by Arslan and Karan (2009) using the logit estimation technique found a direct relationship between the likelihood of corporate default and trade credits, corporate tax, financial expenses, and net profit but tends to be negative for gross profit for domestic firms. They further found that the likelihood of corporate default increases with the ratio of inventory to total assets but decreases with net profits and net sales for international firms. This implies that credit risk affects the performance of firms and most banks. It must, however, be noted that the findings of Arslan and Karan (2009) were based on purely quantitative results without any qualitative empirical evidence to support their conclusion. Also, the study was based on SMEs which possibly means that a similar study on bigger firms could have produced different results. In another instance, a study was conducted on credit risk management of Islamic banks in nine countries from the South East Asian Countries and Gulf Cooperation Council regions by Misman and Bhatti (2020). The study used the generalised least square panel regression model and found that credit risk is the most dominant cause of failure of banks and is inherent in lending. This means that firms gain reward by accepting that credit granted may default and nothing is hazarded if credit is refused. Brown and Moles (2014) in a study on credit risk management in the UK found that credit rejection is not necessarily the appropriate response to poor credit quality in modern finance theory, rather the required returns must be adjusted for the risk taken. In another development, It was also found that CRM practices are critical for minimizing credit risk and maximizing the Risk-Adjusted Rate of Return (RAROR) which is described as the maximization of profit in consideration of the level of risk that must be accepted (Alexander, Schmeiser, & Schreiber, 2018). This indicates that banks should take risk management practices seriously, change the approach and mindset to improve the quality of assets, plan towards anticipated

adverse change and accordingly provide a hedge against possible risk. In an evaluation of the influence of credit risk management practices on loan performance among banks in Pakistan, Ahmed and Malik (2015) discussed credit terms, and policy, appraisal of clients, collection policy, and dimensions of credit risk management controls in mitigating credit risk. Using the multiple regression approach, the study found that credit terms have significant positive effects on loan performance and increase credit risk in banking. In a similar vein, Cuestas, Lucotte, and Reigl (2020) conducted studies on the banking sector concentration, competition and financial stability among Baltic countries using the Z-score model. The study found that credit risk in the banking sector has increased significantly due to worldwide competition among banks. Moloi (2016), conducted a study on the nature of credit risk information disclosure among 5 South African banks and found that information relating to banks' credit risk mitigation strategies, banks' strategy of reducing credit risk exposure, banks' approach to the valuation of pledged collateral, and credit enhancement must be improved to effectively manage credit risk. In this study, the framework regarded financial variables involving cashflow, business performance, credit history, and non-financial variables including character, experience, qualification, and strategies among others, as predictors of commercial banks' failures. The argument is that these should be considerably improved to maximise the credit quality of the banks. The study discusses the practices such as risk identification methods, how credit risk management policies are implemented and the possible best strategies and approaches to reduce credit risk in agricultural finance. The following section 3.2 discusses the empirical literature on credit risk identification methods used by commercial banks to identify credit risk associated with agricultural lending.

3.2 Empirical Literature on Credit Risk Identification Methods

This section discusses the credit risk identification methods adopted by commercial banks to identify credit risk in agricultural finance. Risk identification entails taking stock of potential risks and weaknesses of an organization and creating awareness of the risks exposure of the organization (Caruso, Gattone, Fortuna, & Di Battista, 2021). Risk identification methods are used by commercial banks to identify current and possible threats in loan facilities and practices of lending (Lagat et al., 2018) to agriculture. There are different methods of determining credit risk posed by borrowers such as sensitivity analysis, external audit checks, internal audit checks, portfolio view method, review method, expert judgment, credit portfolio view approach, scenario-based approach, objective-based approach, chart-based approach, consultative view from third

parties, independent agency review method, credit referencing bureau reports, a tax return for self-employed borrowers, credit rationing, loan syndication method, Z-score approach, instance-based approach and credit rating among others (Konovalova, 2009; Konovalova et al., 2016).

Huang (2018) conducted a study on credit risk identification of the real estate industry in China by using the Z-score model and Fisher test. The study found that credit risk identification is the core foundation for understanding, measuring, and managing credit risk in commercial banks in real estate development. Even though this finding is centered on real estate development, the results are a lesson for credit risk management regarding agricultural lending among commercial banks. Therefore, there is a need for effective credit risk identification methods in commercial banks to efficiently identify, measure, and mitigate credit risk exposure in agricultural finance. Abbas, Haider, Zainab, Hassan and Fazal (2018) conducted a study on the remodeling of credit risk management practices in Pakistan using interviews and OLS and found that risk identification and analysis of credit risks have strong positive relations with practices used by management in mitigating risks. Assessment, monitoring, and evaluating risks are less significant than identifying and analysing risks. However, the study is cross-sectional and the authors adopted the convenient sampling technique limited to only one region in Pakistan. The findings of Abu and Al-Ajmi (2012) contrasted with the results of Abbas et al. (2018) as risk monitoring and identification are considered the most important factors in credit risk management practices.

In another instance, Abu and Al-Ajmi (2012) found in a study on risk management practices of Islamic banks in Bahrain that, effective credit risk management practices are determined by the extent to which risk officers understand risk, risk management, and efficient risk identification. The study further found that the level of risk faced by Islamic banks is higher than the conventional banks. Be that it may, banks need more refined credit risk identification methods and procedures for managing credit risk in agricultural finance (Doran et al., 2009).

Konovalova et al. (2016) posited that different types of risk identification methodologies or one methodology used with different algorithms usually do not yield similar results on the classification of loans into either 'good' or 'bad.' In other words, the application of different methodologies can result in categorising the same loan as 'good' or 'bad.' Therefore, the instability in the classification of loans affects assessments by 20 percent of the total amount of

loans granted (Solojentsev, 2004). It is noted in this study that there is no available literature confirming the findings of the 20 percent effect of loan instability on the assessment of the total loan granted to borrowers. However, the findings imply that banks must develop their risk identification methods to quantify, measure, analyse, evaluate, monitor, and control credit risk to acceptable levels of tolerance regarding the recommendations of the Basel Committee on banking supervision. This suggests that to respond to challenges in the current era of credit risk mitigation, there is a need to enhance practices that help in risk identification methods and their applications.

This study seeks to identify appropriate methods of identifying risks to minimize credit risk exposure of commercial banks in agricultural finance. The identification methods discussed in this section in mitigating credit risk associated with agricultural finance include sensitivity analysis; audit checks, review methods, and experts judgment; credit portfolio view method; scenario-based risk identification; objective and chart-based approach; consultative views from third parties and independent agency review approach; use of credit referencing bureau reports; tax returns for self-employed borrowers; credit rating and loan syndication approach; Z-score model and instance-based approach; and credit rating method. These methods are grouped into various subsections in this chapter.

3.2.1 Sensitivity Analysis as credit risk identification method

This subsection reviews the literature on sensitivity analysis of credit risk identification methods. This is a sub-heading following the general credit risk identification described in section 3.2. Sensitivity analyses are the first risk identification methods used to identify credit risk associated with agricultural finance discussed in this section. Sensitivity analysis entails the study of how uncertainties in model predictions are determined by uncertainties in the model inputs (Lilburne & Tarantola, 2009). Sensitivity analysis aims to quantify the rate of change of the model output resulting from a minor distinction in the uncertain model inputs (Lilburne & Tarantola, 2009). Castro (2013) examined the microeconomic determinants of credit risk in the banking systems of Greece, Ireland, Portugal, Spain, and Italy. Employing the dynamic panel data approach, the study identified sensitivity analysis to be an effective method for distinguishing credit risk. Oliveira, Rodrigues, and Craig (2011) examined risk disclosure practices in the annual reports of Portuguese credit institutions and found sensitivity analysis to be an important tool in

identifying credit risk. Also, Nwude and Okeke (2018) conducted a study to determine the impact of credit risk management on selected Nigerian banks using OLS. Based on their findings, the market risk exposure of banks is determined by underlying risk factor volatilities and banks' portfolio sensitivity to the movements in those factors of risk. In support of this finding, Amadhila and Ikhid (2016) carried out a study on agricultural finance constraints in Namibia. Using the purposive-judgment sampling and noticing; collecting and thinking approach, the study found that sensitivity analysis is key for banks to identify potential risk and ensure a common default correlation impacts on credit which is highly at risk and anticipated losses relatively differently. Credit analysts welcome sensitivity analysis without stimulation to speed up computation in credit risk identification and therefore considered it a simple method in assessing the impact of the correlation shift in developed countries such as the US and UK (Maraux, 2010). The sensitivity of banks' credit risk is determined by technical considerations such as data availability, loan losses, defaults, and reserves for loan losses in Belgium (Ferrari, Van Roy, & Vespro, 2021). Therefore, commercial banks can use the volatility of credit spreads, loan losses, and defaults to estimate the sensitivity of the intensity of credit at risk encountered by the banks in agricultural finance (Jarrow & Turnbull, 2000; Rao et al., 2020). The sensitivity analysis discussed in this section by various authors such as Amadhila and Ikhid (2016); Castro (2013); Ferrari, Van Roy and Vespro (2021); Maraux (2010); Nwude and Okeke (2018); and Rao et al. (2020) were generic and do not specifically relate to agricultural lending. Apart from the sensitivity analysis approach, some other relevant methods in the identification of credit risk in agricultural lending include audit cheques, review methods and expert judgment. These methods are discussed in subsection 3.2.2.

3.2.2 Audit Checks, Review Method, and Expert Judgment

This subsection discusses audit checks, review methods, and expert judgment as methods used by commercial banks to identify credit risk in agricultural lending. Apanga et al. (2016) conducted a study on credit risk management of Ghanaian listed banks. The study gathered data from a questionnaire, analysed internal credit policies and procedure manuals, and semi-structured interviews. It was found that banks must consider graduating from the use of subjective-based analysis such as probability estimates, thoughts, judgment, experience, and perceptions in identifying and quantifying credit risk exposure to the use of expert and /or accounting bases systems such as external and internal audit where key accounting variables are combined and

weighted to either produce a credit risk score or the probability of measuring default. It was suggested that, if the credit risk score, or the probability, attains a value above the critical benchmark, loan applicants are either rejected or subjected to more scrutiny. This provides a more reliable credit grading for agricultural borrowers. Internal and external audit checks are essential in the identification and mitigation of credit risk exposure in agricultural finance. Adamu, Asongo, and Nyor (2014) carried out a study on credit risk management of microfinance banks in Nigeria. The study which was purely conceptual and practical t found audit cheques to be relevant in identifying credit risk. Adamu, Asongo, and Nyor (2014) indicated that an internal audit which is an independent appraisal function be carried out continuously whilst an external audit which serves as the second opinion is carried out on an annual or biannual basis to identify potential credit risk in agricultural finance. This leads to the adoption of the best practices to mitigate the effects of such risk. In a study on audit practices and assurance in Ghana, it was posited that external an auditor obtains and evaluates audit evidence to obtain reasonable assurance about whether the financial statements give a true and fair view or are fairly presented (Addo, 2015). It was found in a study on the credit risk management system of Ghanaian commercial banks using interviews and document analysis that, through audit tests and investigations, credit risk can be detected before it gets out of control (Afriyie et al., 2018). In another study on credit management practices on lending portfolio among savings and credit cooperatives among Islamic banks in Kenya, Lagat et al. (2018) found that physical inspection; financial statements analysis; and audit checks, and review are the most significant methods of risk identification. The findings of Lagat et al. (2018) are not different from Osayi et al. (2019). Osayi et al., (2019) carried out a study on risk management approaches and banks' portfolio investment performance in Nigeria using OLS and found that a regular review risk management process is a major tool used to identify credit losses. Kumar and Kavita (2016) confirmed that credit audit procedures such as audit on the quality of loan portfolios, reporting on regulatory compliance, review of credit administration, and credit quality are effective in identifying potential credit risk faced by Indian banks. Addo (2015) equally suggests that credit risk can be effectively detected at early stages if the internal auditor is empowered to perform an independent appraisal function, especially in commercial banks. Even though this argument put up by Addo (2015) is strong, literature (Alqudah, Amran, & Hassan, 2019; Cooper, Leung, Dellaportas, Ahmad, & Taylor, 2009) found that because internal auditors are employed by management they are

mostly not practically independent of the discharge of their duties towards management. However, internal auditors, no doubt detect potential credit risk in agricultural lending in commercial banks (Argento, Umans, Håkansson, & Johansson, 2018; Čular, Slapničar, & Vuko, 2020).

Expert judgment has been considered as the best tool used to predict events likely to occur in the future regarding the identification of credit risk among banks in Nepal (Indra, 2015). This is because most banks in Nepal embraced the use of expert judgment to identify and measure credit risk. Using Bayesian methods for calibration and aggregation of expert judgment, Hartley and French (2020) established that banks use expert judgment techniques to identify deceitful borrowers during the assessment process of loans (Hartley & French, 2020). From the foregoing discussion, it implies that expert opinion is significant and must be sought in the credit risk identification process. The following subsection discusses the empirical studies on credit portfolio view as a method for identifying credit risk.

3.2.3 Credit Portfolio View as a Risk Identification Method

The subsection discusses credit portfolio view as a risk identification method. Credit portfolio view (CPV) can be used to identify credit risk among commercial banks in agricultural finance as summarised by BoG (2018). In a study on credit risk management in Australia using financial statements and KMV structural models, Allen and Powell (2011) clarified that the CPV helps in the creation of migration adjustment ratios and also links migration possibilities to microeconomic factors (unemployment rate, GDP growth rate, and interest rate). Simply put, the study verified that the credit portfolio view is relevant in the identification of credit risk. Stiroh (2006) conducted a study on the portfolio view of banking with interest and non-interest activities among US banks. It was found that, for more closely tracking the changes in the quality of credit portfolio, commercial banks should develop models that build on market perceptions or specific credit transactions and identify credit risk. This suggests that the portfolio plays a significant role in the identification of credit risk (Stiroh, 2006). In a theoretical approach between the portfolio view model and credit risk model among banks in Tunisia, it was found that, market view information when available data emanates from different sources such as banks' credit spread or comparable transactions of market prices (Derbali & Hallara, 2013). This implies that market information of this kind exists for many segments of which a portfolio view is an option for

identifying risk. In the context of this study, there is limited literature on credit portfolio view as a method used to identify credit risk associated with agricultural lending. This study serves as a source of recent literature on portfolio view method used by banks to identify credit risk in agricultural finance among commercial banks. The following subsection 3.4.2, discusses scenario-based approach as a risk identification method.

3.2.4 Scenario-Based Risk Identification

Another useful credit risk identification method is scenario-based risk identification. A study conducted by Kattel (2015) on credit risk identification techniques used by Nepalese commercial banks found that scenario analysis is key in determining the credit risk of banks. It was again found that managing credit using scenario analysis involves scheming and predicting the value of an investment under a variety of different situations, or scenarios (Kattel, 2015). It was further found that scenarios range from very likely to incredible, but still possible. Kattel (2015) however found that, even though some banks use the scenario-based approach as a credit risk identification technique in the identification of credit risk by commercial banks in Nepal, other banks do not embrace the approach. This implies that the use of the scenario-based technique to identify credit risk is significantly different among banks. Also, another study on fundamental risk and valuation uncertainty was conducted by Joos, Piotroski, and Srinivasan (2016) in Singapore using a scenario-based value estimation method. It was found that, for each scenario, the bank or analyst considers historical data and the chain of events that will cause the factors in that scenario to impact the banking performance (Joos et al., 2016). Caruso et al. (2021) established a study on credit risk evaluation among banks in Italy using cluster analysis for mixed data and found that risk identification methods should involve stress test scenarios to ensure that the key weaknesses of the organisations involved are tested. They further found that banks must maintain sufficient capital and liquidity to strategically tailor scenarios to their risk profiles to appropriately manage credit risks. Using a multinomial distribution, it was found that, scenario-based credit risk identification method identifies credit risks in agricultural lending and makes these risks broadly understood to minimize credit risk exposure in North America (Amin, 2016). Following this, the Basel II committee emphasised the use of both quantitative and qualitative standard methods such as stress testing and scenario analysis to identify credit risk (IMF, 2014). The committee, however, stressed that there have not been adequate and comparable

approaches on the part of banking supervisors in credit risk mitigation. This implies that commercial banks must adopt the scenario-based approach to examine scenarios that are affected and identify credit risk associated with agricultural finance to mitigate credit risk exposure of the banks. All the literature reviewed here is general and not directly related to agricultural finance in Ghana, and in this way, could be limited in terms of applicability. The use of scenario-based techniques only to identify risk is not adequate. The subsequent subsection 3.3.5 highlights empirical studies on objective and chart-based approaches for credit risk identification.

3.2.5 Objective, and Chart-Based Approaches for credit risk identification

In addition to the Scenario-based risk identification described in the previous section 3.3.4, this section discusses objective and chart-based methods of identifying credit risk in agricultural lending. Kozodoi, Lessmann, Papakonstantinou, Gatsoulis, and Baesens (2019) used a multi-objective technique to evaluate profit-driven feature selection in credit scoring among banks in the UK. It was found that credit risk can be identified easily when the objectives of banks are clearly stated and understood by participants (Kozodoi et al., 2019). It was further posited that unknown risks could emerge in a well-facilitated creative brainstorming where collaborators work in teams to articulate risks with regard to set objectives. Also, a study was conducted on the audit committee characteristics and financial performance of listed manufacturing firms in Nigeria using the panel multiple regression techniques. It was established that objective-based credit risk identification could be powerful and effective when used at the executive level with the involvement of the audit committee and the Board of directors (Micah, Oyedokun, & Gimba, 2020). However, this finding was limited to manufacturing firms in Nigeria with little attention on agricultural finance by commercial banks. In a review approach on corporate governance manual in Ghana, it was found that commercial banks must implement only decisions in quest of their objectives and hence credit decisions associated with agricultural finance that deviate from the prime objectives of the banks pose potential credit risk (Danso, Kong, Owusu-Akomeah, & Afriyie, 2019). Even though this study does not directly relate to agricultural finance and banks, it provides additional information on how relevant the use of an objective-based approach could be in the credit risk identification process among commercial banks in Ghana.

In another instance, Ajayi, Ajayi, Enimola, and Orugun (2019) examine the effects of capital adequacy on the profitability of deposit money banks in Nigeria. Using the OLS technique, it was found that, the correlation between credit risk, and set objectives, and the likely impacts are established by the use of an objective-based approach. It was established in an examination of system-focused risk identification analysis in the UK that, the objective-based approach requires highly skilled human assets to make the approach effective (Powell, Mustafee, Chen, & Hammond, 2016). This argument indicates that the objective-based approach could only be effective when the objectives of commercial banks are clear, well understood, and with the right calibre of credit, officers to identify and mitigate credit risk exposure of the banks in agricultural finance.

A chart-based approach to identifying credit risk exposure in commercial banks in agricultural finance is also discussed in this subsection. Huang (2018) examined credit risk identification of the real estate industry in Chinese banks. Using the Z-score model, it was established that, organisational charts describe the activities and structure of commercial banks in the identification of credit risk as identified in a study on Chinese commercial banks in real estate development. This finding does not however is centred on the real estate industry and is not specifically related to agricultural finance. In other jurisdictions like Japan, Hiwatashi (2008) in a research on cyber risk management with enterprise risk management framework and Basel II, found that charts enable risk managers to identify areas of risk concentration, establish participants with high authority who supervise the effective implementation of risk management strategies. However, the finding of Hiwatashi (2008) was based on a study that was done 19 years ago and also does not relate to agricultural finance. The chart-based approach identifies bottlenecks, and determines a critical path in planning, identifying, and prioritising credit risk (Huang, 2018). In an evaluation of risk-based x-bar chart with sample size and sampling interval in Hungary using genetic algorithms and nedler-mead direct search algorithm, Kosztyán and Katona (2018) identified chart-based approach as a significant risk identification method. However, the chart-based approach also stressed a variety of techniques such as analysis of loan products, dependency analysis, site analysis, loan decision analysis, critical path analysis to minimize credit risk exposure but does not establish the severity and frequency of credit losses (Kosztyán & Katona, 2018). The next subsection discusses empirical studies on consultative

views from third parties and the independent agency review approach as another method for identifying credit risk.

3.2.6 Consultative View from Third Parties, and Independent Agency Review Approach for Credit Risk Identification

This subsection elaborates the evidence on consultative views from third parties and the independent agency review approach as credit risk identification methods. Adekunle, Nyikahadzoi, and Warinda (2020) evaluated some models of financing smallholder farmers to trigger agricultural innovation in sub-Saharan regions of Africa. The study used a conceptual and review approach and established that consultative views from third parties and independent agency reviews play significant roles in identifying credit risk associated with lending. Consultative views from third parties and independent agency reviews of borrowers' creditworthiness were identified in the OECD report as critical in mitigating credit risk exposure (OECD, 2019), particularly in agricultural lending. The OECD (2019) report also pointed out that assessment and reports of third parties are necessary for conducting an in-depth review of borrowers before credits are given out and hence, minimizes potential credit losses. Also, in a report issued by the Bank of England (BoE, 2019), it was established that information gathering from independent agencies such as independent research providers, and civil organizations which include NGOs, affected groups, and key stakeholders are necessary for identifying credit risk in commercial banks' lending to agricultural. Adeleye, Annansingh and Nunes (2004) carried out a study on risk management practices among Nigerian banks. The study used both quantitative and qualitative approaches and found that third-party consultation and independent agency reviews are very significant in exploring credit risk. Their finding is however not current and does not also relate to credit risk associated with agricultural lending. Notwithstanding, this implies that commercial banks must request third parties, and independent agencies to periodically report on the risk profile of potential borrowers and how they comply with commitments and policies (Adeleye et al., 2004). In other jurisdictions such as Japan, a study on the challenges and perspectives for the development of banking credits by Ezangina, Evstratov and Jovanovic (2016) using the review approach found that independent agency review is regarded very significant in identifying credit risk. Similarly, Razman and Safian (2019) evaluated debt recovery practices among Islamic banks in Malaysia using content analysis and the results of their finding were not different from Ezangina, Evstratov, and Jovanovic (2016).

This implies, commercial banks should resort to the use of rating agents, civil society organizations, specialized consultancies, debt recovery institutions as well as risk monitoring service providers to effectively identify credit risk and provide the best strategies in minimizing their impacts on banking operations (Ezangina et al., 2016; Razman & Safian, 2019). This would help detect potential credit risk at the initial stages of assessment and encourage agricultural lending as a viable business.

However, regarding cases that have high risks where third parties and independent agencies are required to perform compliance review for policies and guidelines, sections 145 and 146 of the Banks and Deposits Taking Institutions Act, 2016, Act, 930 of the Republic of Ghana stipulates that the confidentiality obligations of the officials and employees of the banks to the borrowers should be highly respected. Be that as it may, sections 145 and 146 exclude instances and cases where disclosure is required by compulsion of law, where commercial banks owe duties to disclose to the public, where disclosure is in the interest of the banks, and where the consent of borrowers is sought, particularly credit information disclosed through credit referencing bureau reports. The following subsection 3.2.7 provides details on credit referencing.

3.2.7 Credit Referencing Bureau Report (CRBRs) for Credit Risk Identification

This subsection interrogates credit referencing bureau reports as a method for credit risk identification. Credit referencing bureau reports can also be used as a method for identifying credit risk associated with agricultural lending. A study on competitive information and credit scoring on the performance of commercial banks in Kenya by Machoka and Jagongo (2020) employed a descriptive approach and found the credit referencing bureau essential in the credit risk identification process in agricultural lending (Machoka & Jagongo, 2020). In a similar vein, a study on lending among banks in Zambia by Chakazamba and Marime (2016) found credit referencing bureau as a tool for identifying credit risk. The study described a credit referencing bureau as an organisation that collects information on credit consumers from different sources and shares it with lenders for the evaluation of creditworthiness. Kusi et al., (2016) conducted a study on credit referencing bureaus and bank credit risk in Ghana and established that the credit bureau is negatively related to bank credit. Their findings imply that banks that use CRBs products and services can minimise their credit risk by reducing the asymmetry of information which helps banks to predict borrowers' enforce their loans as a result of a future denial of loans

by banks. Studies on information sharing through CRBs particularly in Ghana are important for several reasons. Brown (2009) in a study among countries in Eastern Europe using panel estimation of cross-sectional data found credit referencing bureau reports as significant in credit risk identification. Additionally, a study conducted on French civil law countries by Djankov, McLiesh, and Shleifer (2007) found similar results as Brown (2009). Studies conducted on information sharing among eastern European banks by Brown (2009) and Djankov, McLiesh, and Shleifer (2007) in French Civil law countries were carried out in developed countries where housing addresses and street names are well structured. In the case of Ghana, which is marked by poor street naming and address system, the result and implications from a similar study could be very different.

The existence of CRBs in Ghana minimises the weakening performance of the banking sector. It rather strengthens the lending position of banks amid challenges and difficulties in credit allocation and loan recovery (Kusi, Agbloyor, Fiador, Osei, & 2016). The Credit Reporting Act 2007 (Act 726) was enacted to permit information sharing amongst institutions in the banking sector. Therefore, three credit referencing bureaus have been established in Ghana: XDS Data Credit Reference Bureau, Hudson Price Credit Bureau, and Dun and Bradstreet Credit Bureau Limited (Churchill, 2013). The XDS Data Credit Reference Bureau originated from South Africa and was subsequently established in Ghana in 2008 and started operating in 2010 in monopoly until 2013 where Hudson Price Credit Bureau, and Dun and Bradstreet Credit Bureau Limited that originated from America, Europe, and some countries in Africa commenced operations (Kusi et al., 2016). Consequently, bank savings and loan organisations as well as microfinance institutions are the only institutions mandated to submit monthly financial data to the CRBs. However, Osafo and Ameh (2020) pointed out that, most financial intuitions in Ghana do not comply with the requirements of Act 2007, Act 726, making the data provided by the XDS Data Credit Reference Bureau, Hudson Price Credit Bureau, and Dun and Bradstreet Credit Bureau Limited unrealistic.

The above indicates that credit risk bureau reports play significant roles in identifying credit risk associated with agricultural finance at the initial stage by way of information sharing as established by Simovic, Vaskovic, and Poznanovic (2009) in a study on credit referencing bureaus among banks in Serbia using descriptive statistics. However, because of the poor

address and the informal nature of agricultural borrowers in Ghana, not all these borrowers file their credit information with the credit risk bureaus (Osafo & Ameh, 2020). As indicated by Osafo and Ameh (2020), it would therefore be practically impossible for commercial banks to have access to adequate credit information on borrowers in agricultural finance if they do not comply with the requirements of the Ghana Credit Reporting Act 2007 (Act 726). Tax returns for self-employed borrowers are a good source for borrowers' credit information are discussed in subsection 3.2.8.

3.2.8 Tax Returns for Self-Employed Borrowers for Credit Risk Identification

Tax returns for self-employed borrowers are yet another approach in which credit risk associated with agricultural lending can be identified. Subject to section 125, section 124 of the Ghana Income Tax Act 2015 (Act 896) stipulates persons to file their annual returns with the Commissioner-General four months after the year of assessment. These are assessments of income generated during the year of assessment. Kunbuor, Ali-Nakyea, and Demitia (2017) evaluated the law of taxation in Ghana. They used tax-based assessment involving quantitative and qualitative techniques and found tax returns for self-return borrowers to be significant in identifying credit risk. Accordingly, tax returns for self-employed borrowers enable the Commissioner-General to ascertain the assessable and chargeable income of those persons to determine the actual amount of tax paid or payable (Kunbuor, Ali-Nakyea, & Demitia, 2017). A higher tax paid or payable by a borrower indicates the level of income for that particular borrower. This level of income helps in ascertaining the risk level of the borrowers to make a good lending decision to avoid credit losses. In addition, tax returns disclose the sources of income and help banks to make a lending decision. For instance, a study was conducted by Abdul-Razak and Adufula (2013) to evaluate taxpayers' attitudes and their influence on tax compliance decisions in Tamale, Ghana using interviews and Spearman Rank correlation coefficient. It was found that tax returns provide details of the sources of income of borrowers and that borrowers are very concerned about the tax they pay (Abdul-Razak & Adafula, 2013). The study further found a significant positive relationship between the level of understanding and tax compliance decisions. The level of unstinting repayments exposes the strength of taxpayers and determines whether a particular borrower can repay a loan or not. Using descriptive statistics, however, Antwi, Inusah, and Hamza (2015) in a study on the effects of demographic characteristics on small and medium enterprises on tax compliance in Tamale, Ghana found that women and

young entrepreneurs tend to be non-compliant to tax laws. This implies that, if borrowers in these regions are women or young entrepreneurs, the possibility of assessing all their income sources to ascertain their level of income and repayment capability could not be ascertained. Tcaho and Poku (2013) conducted another study on tax administration and evasion in Ghana using descriptive, interview, and explanatory approaches, and it established that most taxes are not collected because of tax evasion. This suggests it would be practically impossible to use the tax returns for borrowers as a credit risk identification method to ascertain the repayment capability of borrowers who evade taxes. Therefore tax evasion and non-compliance hinder the ability to use the tax return of self-employed borrowers as a means of identifying credit risk (Antwi, Inusah, & Hamza, 2015; Kwame, Tchao, & Poku, 2013). In other jurisdictions such as the U.S, Isin (2018) used descriptive statistics to evaluate tax avoidance and the cost of debt. The study established that tax avoidance is positively related to loan spread. The discussion in this subsection recommends that commercial banks should consider the tax returns of borrowers as a means of identifying credit risk exposure. This helps lenders to identify credit risk in lending to the agricultural sector (Isin, 2018). Credit rationing and loan syndication have are discussed in section 3.2.9 as some of the credit risk identification methods.

3.2.9 Credit Rationing, and Loan Syndications for Credit Risk identification

In this subsection, credit rationing and loan syndication as credit risk identification methods are elaborated. Credit rationing and loan syndications cannot be overlooked as methods for identifying credit risk related to agricultural lending. Awunyo-Victor et al. (2014) describe credit rationing as a condition in which borrowers are unable to apply for credits or are not offered the desired amount of credit they applied for. Ferri, Murro, Peruzzi, and Rotondi (2019) investigated bank lending technology in Europe using regression and descriptive analysis. It was found that credit rationing is significant in identifying credit risk and that the joint use of soft information and transactions lending reduced credit rationing. In a study on uptake of insurance-embedded credit in Kenya using randomised controlled trial, it was found that credit rationing must be used to identify risk at an early stage otherwise, the management of credit risk exposure would be useless if loans fall into the hands of the wrong borrowers (Ndegwa, Shee, Turvey, & You, 2020). This finding is insurance-based and does not relate to agricultural finance. Similarly, using the probit regression model to evaluate the discrimination against agricultural sector credit rationing behaviour of Ghanaian commercial banks, Sackey (2018) found that there is a need for highly

trained and qualified credit officers to ration credit by limiting loan access to minimize credit risk associated with agribusiness finance. Also, Apanga et al. (2016) evaluated credit risk management practices within financial institutions in Ghana. The study used a questionnaire and semi-structured interviews. Results confirm credit rationing as a tool for identifying credit risk and that credit officers must be remunerated per the number of loans they recover to increase loan recovery from potential defaulters in agricultural lending. In effect, this would discourage credit officers from neglecting their recovery duties as they can be cumbersome. However, this approach is only applicable to bonuses and commissions and not the mandated salary regulated by the Ghana fair Wage and labour commission. Subsequently, it was found in a study on the determinants of credit rationing among rural banks in Nigeria using multinomial logit model that, farmers who are either engaged in subsistence farming or trading have a significant effect on credit rationing with greater impact on farm profit and location (Kofarmata & Danlami, 2019). Therefore, commercial banks must critically assess the repayment capacity of agricultural borrowers.

Also, Altunbaş, Gadanez, and Kara (2006) examined the evolution of the syndicated loan market in Latin America using a descriptive approach. Results indicated that loan syndication⁴ provides the best approach to mitigating credit risk exposure of commercial banks. It was further found that syndication of loans is a way of effectively diversifying the loan portfolio of banks and reduce costs. Using descriptive and inferential statistics to assess loan quality portfolio diversification, loan syndication and financial performance among Kenyan commercial banks, Ongallo, Gesami, and Mwaniki (2019) found that lenders efficiently reduce screening costs and effectively monitor the activities of borrowers that are usually executed by agents of the banks in loan syndication. This is because few numbers of well-structured commercial banks universally act against borrowers' repayment problems and reduce high credit risk exposure in lending to agriculture. Afande (2014) evaluated credit risk management practices in Kenya using semi-structured questionnaires and descriptive statistics. Findings showed that loan syndication should be used by commercial banks in developing economies as a risk management tool to

⁴ Loan syndication refers to where two or more banks come together to form a group to lend to a single borrower with an intent to minimise loan losses (Altunbaş et al., 2006).

control credit losses. However, Ojayi et al. (2019) conducted a study on the risk management approach and portfolio investment of banks in Nigeria and adopted the use of a loan-year fixed effects approach to assessing the crises between 2007 and 2009. The findings of their study indicated that banks that relied greatly on wholesale funding at the beginning of the crisis were highly likely to exit loan syndicates at the time of the crisis. In essence, commercial banks must resort to group lending to minimise credit risk associated with agricultural finance (Altunbaş et al., 2006). Another credit risk identification method, Z-score and instance-based approach are discussed in subsection 3.2.10

3.2.10 Z-Score Model, and Instance-Based as credit Risk Identification Approaches

This subsection, elucidates the Z-score model and instance-based approach as credit risk identification methods are substantiated. Altman propounded the popular Z-score model in 1968. Huang (2018) evaluated credit risk identification methods of the real estate industry in China using the Z-score model and Fisher test. Results show that the Z-score model is a multiple regression analysis models that choose the metrics such as the mean, variance, and standard deviation among others that reflect the financial performance and position of the borrowers (Huang, 2018). Using Z-score to evaluate to measure banks' insolvency risk in UK, Mare, Moreira, and Rossi (2017) found that, the Z-score model is a mathematical model that identified the possibility of credit risk. This implies that commercial banks must adopt the Z-score model to identify credit risk associated with agricultural lending to minimize credit risk exposure of the banks. Maria (2016) evaluated a new dynamic modeling framework for credit risk assessment among banks in Brazil. Using the Z-score, it was found that the Z-score model was extended and revised by Altman in 1977 and a second-generation credit risk score model (ZETA) was proposed which increased the variables⁵ in the Z-score model. In the Indian jurisdiction, Tandon and Batra (2014) assessed credit risk, a new horizon in the Indian banking sector, and indicated the Z-score as a model for credit risk management. Bandyopadhyay (2016) studied default on corporate bonds in India apply the Z-score model and found that banks and investors in emerging economies are likely to get early warning signals about borrowers' solvency status by

⁵ Some of the variables include working capital divided by total assets; retained earnings divided by total assets; earnings before interest and tax divided by total assets; price earning ration; market value of equity divided total liabilities; and sales divided by total assets among others (Chen & Xiang, 2017).

using the Z-score model in identifying credit risk. In a study to evaluate dynamic risk model with data mining techniques among Iranian banks, it was found that the Z-score model was used by commercial banks to detect early warning signals about the solvency of agricultural borrowers to mitigate adverse credit risk exposure (Moradi & Rafiei, 2019). Throughout the discussion, there is a limited review of the literature regarding credit risk identification among commercial banks specifically relating to agricultural lending.

Also, Guo, Zhou, Luo, and Liu (2016) evaluated credit risk assessment for investment decisions using the instanced-based approach. Results indicate that an instance-based credit risk assessment and identification model that evaluates the returns and risk of each loan in Europe were effective in identifying credit risk. They formulated an investment decision in P2P⁶ as a problem of portfolio optimisation with boundary constraints. To validate the proposed model, Guo et al. (2016) further conducted detailed experiments on specific real-world datasets from two significant and notable P2P lending marketplaces in Europe. The results of the experiment indicated the effectiveness of the model in improving the performance of investment compared with the existing P2P lending. Using a non-dominated sorting genetic algorithm, Babaei and Bamdad (2020) also found instanced-based approach credit identification to be significant among institutions in Iran. With the instance-based approach, commercial banks can verify the identity, bank account, and cashflow of agricultural borrowers; assess possible credit risks associated with agricultural lending. This enables banks to identify efficient means of recovering loans from defaulters to minimise credit risk as indicated in a study to evaluate dynamic risk model with data mining techniques among Iranian banks (Moradi & Rafiei, 2019).

3.2.11 Credit Rating as Credit Risk Identification Approach

This section expounds on credit rating as a credit risk identification method. The US Standard and Poor's Financial Services (SAP's, 2020) defines credit rating as the measure of the creditworthiness of borrowers. Ubarhande and Chandani (2021) evaluated the elements of credit rating using bibliometric analysis, a structured review of 158 research papers, and multiple regression techniques. Findings of this study found credit rating to be a significant means of

⁶ Peer-to-peer (P2P) refers to a type of lending involving the disintermediation followed by re-intermediation. Banks are no longer intermediaries, but new intermediaries are set up to provide services such as **Providing** online platforms for borrowers and lenders to contact each other; Verifying the borrower's identity, bank account, employment, income, and so on (Guo, Zhou, Luo, & Liu, 2016).

identifying credit risk and that the factors affecting creditworthiness are sector-specific. Also, Eijffinger (2012) evaluated the roles and influence of rating agencies on credit risk assessment in the Eurozone using credit rating techniques. It was found that credit rating is an effective method for identifying and measuring the credit quality of debt instruments in agricultural finance. Bae (2020) assessed the credit rating framework for real estate investments in Lithuania and found internal rating as a significant tool for credit risk identification. Essentially, the validation of the internal rating system is not just simply reporting the requirements involving the production of statistics validation, but rather a process (Bae, 2020). Also, using the multi-criteria approach for modeling small enterprise credit rating in China, credit rating was found to be efficient in identifying credit risk. However, the robustness of the procedure and data used to arrive at the parameter estimation must be relevant to the estimations (Chai, Wu, Yang, & Shi, 2019).

The findings outlined above indicate that commercial banks must ensure agricultural borrowers have strong capacities to meet repayment commitment of loans granted for agricultural purposes and the interest accruing to avoid credit losses and mitigate credit risk exposure. The rating, therefore, provides the foundation for commercial banks to detect the creditworthiness of agricultural borrowers. In the case of banks, a large database of borrowers and dealings in their respective business segments are not readily available (SAP's, 2020). Therefore, more information on individual clients or particular transactions is usually disposed and an expert judgment is used to complete the picture. It must be noted that it is highly impossible at times to get additional information from external sources (Huang, 2018). Based on the above, it is necessary to review rating periodically when new information is obtained from internal and external sources to effectively identify and mitigate credit risk in agricultural finance. Considering the importance of the outputs of the internal rating system in the assessment of regulatory capital adequacy and internal risk appraisal, capital, and pricing calculation in a study conducted by Linting and van der Kooij (2012) in the US using a multi-period logistic regression model, it is imperative to scrutinize the performances of any rating model that has been used. This implies that, even though the internal rating system is significant in the credit risk identification process, it should be validated by verifying the design and discriminatory strength of the model of rating and examining the calibration of parameters (Ash-shu, 2013). Ensuing, ratings should be distinguishing sufficiently between agricultural borrowers who default and those who do not. It has been argued that using statistical tests alone is inadequate to validate the internal rating

system, therefore benchmarking with external sources as a competitive complimentary technique is proposed in identifying credit risk associated with agricultural finance in commercial banks (Afriyie et al., 2018).

3.2.12 Remarks on Findings on Credit Risk Identification Methods

This section summarises the findings on the credit risk identification methods. The findings indicated that sensitivity analysis; audit cheques; credit portfolio view approach; scenario-based identification; objective and chart-based approach; consultative view and expert judgments; credit referencing bureau reports; tax returns from self-employed borrowers; credit rationing; Z-score and instance-based approach as well as credit rationing could singly or in combination be used to identify credit risk. Considering the numerous credit risk identification methods, it is expected that commercial banks effectively spot and identify credit risk associated with agricultural lending through regular audit checks or financial statement analysis of agricultural borrowers; measuring the creditworthiness of agricultural borrowers; limiting credits to specific agricultural borrowers; resorting to group lending; assessing the repayment capacity of agricultural borrowers; examining the correlation between risk and objectives of commercial banks; distinguishing loan defaulters from those who do not default; collaborative lending; and experts' reports among others to mitigate the effects of credit risk exposure of the banks. However, credit risk identification methods and processes are not sufficient, comprehensive, and deep enough to reliably identify and measure credit risks in commercial banks (Chen, Wang, & Wu, 2010; Khalid & Amjad, 2012; Ongallo, Gesami, & Mwanik, 2019; Rosch, 2003; Ubarhande, 2021). This accounts for critical gaps in modern credit risk management in sub-Saharan African countries particularly Ghana which is the focus of this study. Regulators in the United States of America (USA) have noted and been stressing the need for institutions to expand and strengthen their risk identification methods and processes (Caruso et al., 2021) and to link credit risk identification methods to commercial banks' broader scope of credit risk management activities in agricultural lending (Huang, 2018) to mitigate credit risk exposure. By implication, a new paradigm of effective credit risk management process in commercial banks is spanned by specific credit risk identification methods. Credit risks are only measured, transferred, avoided, and managed if they are identified. This suggests that, if the right credit risk identification methods are not considered, fundamental drivers of credit risk in commercial banks are not appropriately understood and actions or plans undertaken will be limited in terms of values. The

literature by Abdelrahim (2013), Kessey (2015), Boahene et al. (2012), and Chali and Reddy (2016) imply that credit risk in commercial banks can only be managed if they are identified. Once the risk is not identified it would be difficult to manage such risk. The literature also suggests that commercial banks should adopt credit risk identification methods to identify and mitigate credit risk exposure in agricultural lending. The literature further suggests that commercial banks could have credit risk identification methods but these methods might not be effective or adequate. Therefore, the need for commercial banks in sub-Saharan Africa to adopt the best credit risk identification methods to effectively identify the credit risk is a major factor that drives this study. It implies that the effective use of these methods in the credit risk identification process requires effective implementation of credit risk management policies. The effectiveness of the implementation of credit risk management policies are described in section 3.3.

3.3 Empirical studies on the effectiveness of the Implementation of Credit Risk Management Policies

This section discusses the effectiveness of the implementation of credit risk management policies used by commercial banks in agricultural lending. The significance of reviewing empirical studies on the effectiveness of the implementation of credit risk management policies cannot be overemphasized. First, it provides a broader view on whether or not the implementation of credit risk management policies by commercial banks in agricultural lending is effective. Second, it also provides information on the implication of the implementation of credit risk management policies in commercial banks. For instance, in an investigation on credit risk management and loan performance on banks in Pakistan using questionnaires and descriptive statistics, Ahmad and Malik (2015), revealed that banks with effective sound credit risk management policies and effective implementation of these policies have experienced low loan default ratio. In another instance, Serwadda (2018) assessed credit risk management systems among commercial banks in Uganda. The study employs descriptive statistics, correlation analysis, and a regression model. It was found that commercial banks must design effective credit risk management policies and effectively implement these policies to effectively reduce the effects of credit risk on the banks. Also, Wachira (2017) evaluated credit risk management practices on loan performance of microfinance institutions in Baring County, Kenya using descriptive statistics, Pearson's correlation, and regression analysis. Results indicated that the

implementation of credit risk management practices significantly influences loan performance. Similarly, Kessey (2015) examines the credit risk management practices in the banking industry of Ghana. The study employed an explanatory and exploratory approach to evaluate the strategies for implementing risk policies among Ghanaian banks. Findings show that even though commercial banks formulate policies in managing credit risks, ineffective implementation of these policies leads to credit risk management problems. The empirical studies on the effectiveness of the implementation of credit risk management policies mentioned in this section have been grouped into seven subsections. Subsection 3.3.1 discusses empirical studies on loan appraisal in credit granting; 3.3.2 discussed empirical studies on loan authorisation and approval; 3.3.3 elaborates on empirical studies on borrowers' capacity, character, creditworthiness, credit history, and credit disbursement review. Subsection 3.3.4 highlights empirical studies collateral and credit limit review of borrowers; 3.3.5 discussed empirical studies on the use of credit risk register and policy manuals in granting loans; 3.3.6 discusses empirical studies on compliance with internal guidelines, laws, and regulations. The last subsection 3.3.7 discusses empirical studies on enforcement of restrictive covenants and credit insurance.

3.3.1 Loan Appraisal in Credit Granting

This subsection discussed empirical studies on loan appraisal in credit granting as one of the elements involved in the implementation of credit risk management policies. In a study on effective credit approval and appraisal system using a review mechanism approach among Indian banks, Chilukuri and Rao (2014) revealed that commercial banks must adopt effective credit appraisal⁷ mechanisms whilst granting credits to agricultural borrowers to minimize credit risk. In other words, commercial banks must proactively act in the administration of appraisal and approval systems regarding loans granted for agricultural purposes to avoid poor performance of loans. Also, Muriithi, Waweru, and Muturi (2016) used the panel data technique of the fixed-effect model and generalized methods of the moment to evaluate the effects of credit risk on the financial performance of commercial banks in Kenya. Results attributed the poor performance of banks in Kenya to a lack of capacity in credit analysis and loan administration of the banks to effectively appraise loans before they are granted. Using descriptive statistics and

⁷ Credit appraisal has been described as the evaluation of borrowers' current and future ability to fulfil the interest and principal repayment of loans granted by banks (Chilukuri & Rao, 2014).

inferential statistics to evaluate credit risk management practices among banks in Nigeria, Olabamiji and Michael (2018) indicated that, commercial banks have sufficiently clear credit appraisal policies and lending guidelines applied to mitigate credit risk. Besides, Kessey (2015) conducted a study on credit risk management practices in the banking industry of Ghana using explanatory, exploratory, and trend analysis and found that banks have credit risk management departments responsible for the management of credit risk as well as comprehensive risk management policies on credit appraisal. In addition, Biekpe (2011) evaluated the competitiveness of commercial banks in Ghana using the Panzer-Rosse model and indicated that credit assessment and appraisal ensure that commercial banks appropriately appraise the technical likelihood, economic feasibility, and creditworthiness of the borrowers at most of the time. This means that credit appraisal must assess whether or not agricultural borrowers are likely to pay back the loan within the stipulated time frame or not. This would help avoid bad agricultural borrowers who are interested to access loans but are unlikely to repay. Therefore, commercial banks are expected to identify and get rid of bad clients who are likely to increase credit risk exposure. However, the rise in the value of non-performing loans over recent years suggests that commercial banks can have comprehensive loan appraisal and credit risk management policies but might have implementation problems in lending to agricultural borrowers. Asiama and Amoah (2019) evaluated non-performance and monetary dynamics in Ghana employing the use of the autoregressive distributed lag econometric approach. Results showed no significant effect of monetary policy on the percentage growth of non-performing loans. Because loans comprised a major proportion of credit risk and highly account for the equity of banks, businesses of commercial banks are heavily affected when the quality of loan appraisal deteriorates as indicated by Asiamah and Amoah (2019). It implies that, poor credit appraisal negatively affects loan recovery. Using unrelated regression model and principal components analysis to examine the determinant of non-performing loans in the banking sector, Adusei (2018) found money supply, financial development, microeconomic variables and loan appraisal as significant factor that affect loan performance. It means that, banks could have credit risk management departments but might not have competent, experienced staff or well-resourced staff, who are regularly trained to properly appraise loans before they are granted (Adusei, 2018; Asiama & Amoah, 2019). An evaluation of credit risk management was carried out on commercial banks in Kenya employing descriptive statistics (Mercylynne & Omagwa,

2017). The study found that the effects of credit risk management resulting from the poor appraisal of loans on the financial performance of commercial banks in Kenya are positive. It was further indicated that credit risk problems in banks begin from the appraisal, approval, monitoring, and controlling of loans particularly where credit risk management guidelines such as policies, strategies, or the procedures for processing credits do not exist at all, weak or incomplete. In another instance, Mulafara (2015) evaluated the impact of credit risk on loan performance of Sri Lanka commercial banks employed the use of multiple regression techniques, correlation analysis, and descriptive approach in the investigation of the relationship between loan appraisal, credit rating, financial viability, technical feasibility, risk transfer, diversification of risk, retention of risk and the performance of loans. Evidence from the result of this study showed that loan appraisal, as one of the factors with significant relationship with loan performance. However, this study is limited in scope. It does not consider agricultural lending which is the subject matter of this study.

The empirical review indicates that senior management of banks must provide and ensure proper and best credit risk management appraisal guidelines. It means also that, senior management should outline the scope and proper allocation of credit facilities of banks as well as how credit portfolio is managed through efficient evaluation of loans, how loans should be initiated, appraised, supervised, and recovered (Manjula, 2016; Ogboi & Unuafe, 2013). Consequently, the guidelines must be well communicated throughout the hierarchical structure of commercial banks that, every staff involved in credit risk management is obliged to thoroughly appraise loans granted to agricultural borrowers and enhance proper implementation of laid down appraisal procedures to mitigate credit risk exposure in agricultural lending.

3.3.2 Loan Authorization, and Approval

This section discussed loan authorization and approval as credit risk management policies. Afande (2014), conducted a study on credit risk management practices of commercial banks in Kenya using descriptive statistics and found that top management support in loan authorization and approval greatly influenced credit risk management practices of commercial banks. Employing the review approach to evaluate the effects of credit approval and appraisal systems of banks in India, Chilukuri and Rao (2014), found that, loan authorization and approval significantly influence credit risk among commercial banks. This is similar to Luvsannyam,

Minjuur, Lkhagvadorj and Bekhbat (2021) and the Ministry of Foods and Agriculture (MoFA, 2021) report of Ghana. Further, Afriyie et al. (2018) evaluated the credit risk management system of Ghanaian commercial banks. Using interview and document analysis, results proved that credit risk can only be managed and minimized when formidable strategic approaches such as loan authorization and approval are effectively implemented. This implies that the authorization and approval decisions of banks play a significant role in loan default among commercial banks in agricultural lending and must be carefully implemented. It further implies that agricultural loans that are not properly authorized and approved are likely to result in higher credit risk. Nwankwo (2017) used the multiple regression model to assess the factors affecting access to agricultural credits in the Anambra State of Nigeria. Findings proved that effective implementation of loan authorization and approval processes reduced loan losses. Effective loan authorization and approval process would establish borrowers' capacity, character, creditworthiness, and history. The next section 3.4.3 discussed empirical studies on borrowers' capacity, character, creditworthiness, credit history, and credit disbursement review.

3.3.3 Borrowers' Capacity, Character, Credit Worthiness, Credit History, and Credit Disbursement Review

The empirical studies on borrowers' capacity, character, creditworthiness, credit history, and credit disbursement review have been substantiated in this section. The review of agricultural borrowers and disbursement review in this section is an integral part of this study for unearthing the effectiveness of the implementation of the credit risk management policies of commercial banks in agricultural finance. Derban, Binner, and Mullineux (2005) evaluated loan repayment performance in community development financial institutions in the UK. The study employed regression model and descriptive statistics and found that commercial banks can quantitatively or qualitatively assess the capacity, character, creditworthiness, credit history, and credit disbursement review of borrowers by assigning numbers with the sum of the threshold, a technique normally referred to as 'credit scoring to minimize credit risk. Bumacov, Ashta, and Singh (2014) examined the use of credit scoring in microfinance institutions in France using the regressing model. Findings indicated that assessment of borrowers' capacity character and credit worthiness are potential factors in detecting credit risk at early stages. In another jurisdiction, a study on collateral-based lending among banks in Thailand was conducted by Menkhoff, Neuberger, and Suwanaporn (2006) using a regression model and descriptive

statistics. Results indicated that screening out applicants for bad and good loan applicants and the capacity of agricultural borrowers to repay loans and interest among Thai commercial banks are good signals for reducing credit risk associated with lending. Gouri and Mahajan (2017) examined different models of finance small farmers' agricultural value chain in India employing descriptive statistics and regression models. The study found the assessment of borrowers' capacity, character, creditworthiness, credit history, and credit disbursement review as significant factors in mitigating credit risk. Gouri and Mahajan (2017), revealed that, in the understanding and analysis of information about the condition and whether agricultural borrowers can repay loans, it is essential to identify any future change that will affect the financial condition and the ability to repay the loans by the same borrowers. In a study by Guiral, Moon, and Perez-Garcia (2016) on social responsibility bias lending within the second-largest commercial bank in Europe using descriptive and ANOVA analysis commercial banks must assess Character, Capacity, Capital, Collateral, and Conditions (5Cs) and the credit history of the borrowers as the basic lending principles in the evaluation and grant of loans to agricultural borrowers. In a similar vein, Peprah, Agyei, and Oteng (2017) evaluated how Ghanaian banks use the 5Cs in assessing loan applicants. The study employed the Yamane 1967 statistical formula and rated the 5Cs to be very significant in minimizing credit risk.

Wanjohi (2016) examined the effects of credit risk on the profitability of commercial banks in Kenya using the panel regression model. The study found the regular review of borrowers' character, collateral of borrowers, borrowers' capacity, borrowers' capital conditions, and loan disbursement review as very crucial in estimating the credit risks of the banks. The study further indicated a significant positive relationship between the borrowers' creditworthiness, credit history, loan disbursement review, and credit risks in banks. This implies that commercial banks can minimize credit risk exposure associated with agricultural finance by effectively assessing creditworthiness, credit history, and regular loan disbursement review of agricultural borrowers to mitigate credit risk exposure effects of the banks. Investigating the credit risk management strategies of private commercial banks in Bangladesh using descriptive statistics, Norman, Hossain, and Pervin (2015) discovered that characteristics of borrowers and lenders, and the history of borrowers significantly affect repayment performance. In other jurisdictions such as the U.K, a study on loan delinquencies was conducted by Leow and Crook (2014) using a semi-parametric multiplicative hazard model with time-variant covariates. Results indicated problems

in repayment exist in the form of loan delinquency and default if banks do not adequately examine the creditworthiness of borrowers as well as the capacity to repay loans. In addition, Moss and Suh (2020) evaluated the effect of compliance cost on the supply of bank credit to agriculture using a deferential approach. It was found that banks must appropriately assess borrowers' capacity, character, creditworthiness, credit history, and credit disbursement review and determine the extent to which agricultural borrowers comply with loan contracts, nature of duties, responsibilities, and obligations of the parties. The review implies that the responsibilities for the implementation of collection actions fall within the scope of management and credit officers with appropriate review mechanisms. In other words, agricultural borrowers alone are not responsible for loan repayment problems. Therefore, commercial banks must adequately assess the credit competencies such as creditworthiness, repayment capacity, the credit history of agricultural borrowers and regularly review all disbursement processes before credits are granted. Credit sustainability and development of commercial banks generally depend on the recovery of their loan portfolios. Therefore, credit policies and implementation on agricultural borrowers are very important and must be carried out consistently and constantly. The procedures for the implementation of credit risk management policies depend on conditions associated with the terms in which the loans are disbursed. The disbursement process must evaluate collateral and credit limit requirements which are discussed in subsection 3.4.4.

3.3.4 Collateral and Credit Limits Review of Borrowers

This section discussed the empirical studies on collateral and credit limit review of borrowers in the credit risk management implementation process. Yin, Qiu, and Gan (2019) carried out a study on the information content of collateral under heterogeneous borrower qualities in the Chinese banking market using logit regression. The study analyzed the risk of defaults and collateral for banks and found that collaterals only reduce risk in borrowers with high credit qualities; and that the type of collateral provided by borrowers has a significant impact on defaults for agricultural-related loans. Also, Rahman, Rahman, & Kljucnikov (2016) conducted a study on collateral and SME finance in Bangladesh employing a regression model. The study found that, depending on the bank's internal policies, commercial banks should ask for different collateral that complies with the best interest of the banks to lower loan losses. This implies that because commercial banks do not know the possible hidden information about the quality of borrowers, agricultural borrowers may change their attitude after receiving loans which can lead

to credit losses. As a result, Shee and Turvey (2012) evaluated collateral-free lending with risk-contingent credit for agricultural development in India using classical and quadratic functions and indicated that commercial banks must actively demand collateral such as land, house, and vehicle among others from agricultural borrowers to minimize possible credit risk exposure in agricultural lending to minimize loan losses. Olowa and Olowa (2017) evaluated factors influencing loan repayment using the Tobit regression model and found collateral to be significant in loan recovery. The study further revealed that agricultural borrowers who do not have a sound and solid financial position are not very stable or strong and are likely to default in repayment of borrowed funds and hence, necessitated commercial banks to require collateral from the borrowers to mitigate against possible loan defaults. Also, research on moral hazard reduction in joint liability lending through collateral requirement was carried out by Flatnes and Carter (2019) in Tanzania using a regression model and descriptive statistics. The study found that, with the use of collateral and strict compliance with loan requirement policies, borrowers would make all possible efforts to repay the loans to possess the property used as the collateral. Odonkor (2018) assessed credit risk management practices of Adansi rural bank in Ghana using descriptive statistics, findings indicated that loan policies should be structured backed by collateral to ensure the prohibition of unsecured lending. In contrast, Odonkor (2018) evaluated the credit risk management system of commercial banks in Ghana using descriptive and document analysis and found that borrowers with a strong bargaining power regarding each of the banks are more likely to obtain loans from commercial banks without providing collateral if the number of commercial banks the borrowers work with increases. The review clearly showed that commercial banks must require collateral as a backup against loans advanced for agricultural purposes. This implies that commercial banks must ensure that the collateral provided by agricultural borrowers is valid and substantive. By section 24 (1) of the Land Registry Act 1962 of Ghana, (Act 122), a land document shall be of no effect until it is registered. It means that the document is not valid for all purposes because registration formalities are necessary to establish its validity for legal purposes to be used as collateral. Commercial banks must avoid a property that has been previously used to be pledged against other loans to reduce credit risk exposure in finance agricultural activities. Nevertheless, the financial stability of borrowers remains very relevant. This indicates that collateral offers some level of security to commercial banks on agricultural borrowers who fail to repay their loans.

Apart from collateralizing loans, establishing credit limit exposure on individuals or groups of associated counterparties is critical in managing credit losses in agricultural lending. Meutia, Adam, and Vegirawati (2018) carried out a comparative study on agricultural finance among an agricultural bank of Iran, China, Sudan, Malaysia, and Indonesia using a qualitative approach. Results indicated that credit limits should partially be connected with the internal rating of counterparties and the borrowers. In another study carried out by Gerito (2020) on agricultural finance in Ethiopia using OLS and found that probable future exposures are very essential in setting limits on borrowers across the activities of banks involving on and off-balance sheet events in managing the overall credit portfolio of commercial banks. Another study conducted by Lang and Jagtiani (2010) on the role of credit risk management and corporate governance on the mortgage and financial crises in the US using regressing model and descriptive statistics found credit limit review to be significant in minimizing credit losses. It must however be noted that this study was conducted 21 years ago and does not also relate to agricultural finance. On the contrary, Roslan and Karim (2009), carried out a study on the determinants of microcredit repayment in Agrobank Malaysia. Using the probit and logit models the study found that, cut-off on lending will crush the funding need of businesses particularly agricultural which needs more investment to maximise production. Implying, borrowers are not likely to meet their monthly commitments when the repayment period is shortened as the repayment amount is usually very high, and in this manner, can be worthlessly classified in misconduct states (Roslan & Karim, 2009). It must be noted that there is limited literature concerning credit risk management in agricultural finance among commercial banks. The credit limit review procedures must be documented in the policy manuals and used alongside the credit risk register. The credit risk register and manual are discussed in the subsequent section.

3.3.5 Use of Credit Risk Register, and Policy Manuals in Loan Granting

This subsection elaborated on the empirical review of the credit risk register and policy manuals in the granting of loans. The credit risk register is a document that contains all detailed and comprehensive information on all the risks of commercial banks and should be regularly updated to measure credit risk exposure of the banks (IMF, 2014). Risk register varies from bank to bank and serves as a source of information for reporting risks associated with commercial banks in agricultural lending (BoG, 2019, 2020b; Hull, 2018). According to the banking sector report of BoG (2020a), commercial banks must keep a credit risk register that represents the main output

credit risk identification exercise. BoG positions that, a well-structured operational credit manual creates standard lending policies and procedures that aim at reducing subjectivity and bias in credit decisions. O'Har, Senesi, and Molenaar (2017) conducted a study on the development of risk register tools in the United States employing in-depth interviews and concluded that risk register is a very important tool that facilitates an organization's risk management governance and reduces risk. The study further stipulated that the root causes, responses and regular updates are must be documented in the credit risk register to aid in the credit risk identification process. This implies that commercial banks should effectively maintain a good credit risk register to minimize credit risk exposure associated with loans granted to agricultural borrowers. It further means that the credit risk register must be kept and regularly updated to direct the commercial banks' main focus to prioritize risks as it contains the possibility of risk occurrence and the likelihood of impacts (BoG, 2020b). In addition to regular updates of the credit risk register, commercial banks must consistently review the credit risk management policy manuals to mitigate against credit risk exposure of the banks in agricultural finance. Samuel (2015) evaluated the effects of credit risk on commercial banks' performance in Nigeria employing ratios and a regression model. Results indicated that, credit risk policy manuals significantly influence credit risk and that, management of banks must be very cautious in setting up credit policy manuals. Abbas et al. (2018) examined the remodeling of management practices of commercial banks in Pakistan using multi-stage sampling and OLS. The study found that banks should develop and use credit manuals to ensure consistency in credit decisions and ease lending processes to effectively mitigate credit risk in agricultural lending. Also, Apanga et al. (2016) investigated credit risk management of commercial banks in Ghana using interviews and descriptive analysis and found that effective credit risk management can be achieved by comprehensive use of credit policy manuals produced by management and approved by the board. Further, Harris (2015) evaluated credit scoring using clustered support machine. Results indicated that, apart from the reliability of credit information of borrowers, credit instruction manuals embrace borrowers' credit limits, establishes credit periods, and customers' credit ratings. However, Otwori (2013) evaluated credit referencing and loan performance among commercial banks in Kenya using descriptive statistics and multiple regression and found that only comprehensive adherence of credit manuals in the distribution of credit is not enough to mitigate credit risk effects. This supports the findings of Apanga, Appiah, and Arthur (2016) for

banks to adhere to internal credit requirements of credit risk policy manuals and loan administrative procedures to be competitive in credit risk management. The main objective of credit policy guidelines is to avoid credit extension to agricultural borrowers who do not have the ability or capacity to repay loans. This blueprint assists credit officers and Credit Administrators to adopt proper credit appraisal on borrowers for compliance with internal guidelines, laws and regulations discussed in the later section.

3.3.6 Compliance with Internal Guidelines, Laws, and Regulations in Credit Granting

The empirical studies on compliance with internal guidelines, laws, and regulations in the granting of credit have been highlighted in this subsection. Monye, Nwafor, and Mukoro (2020) carried out a study on the appraisal of the credit reporting Act 2017 in Nigeria. Employing the descriptive and explanatory approach, the study found that banks' compliance with internal guidelines, laws, and regulations build effective credit reporting⁸ systems and avoid credit risk exposure of banks. Similarly, Osiegbu (2006) conducted a study on the level of commercial banks' compliance with the Central Bank of Nigeria's monetary credit policy using the regression model. The study revealed that commercial banks' credit reporting should comply with internal guidelines, laws, and regulations to minimize credit risk. Also, Onyiriuba, Okoro, and Ibe (2020) evaluated strategic policies on agricultural finance in emerging markets of Africa involving Egypt, Morocco, Nigeria, and South Africa. Results showed that commercial banks need aggressive internal policy interventions on agricultural finance to minimize credit losses. Also, BoG (2019) reported that the Central Bank of Ghana requires commercial banks to have an effective regulatory framework and environment to create the infrastructure of credit reporting to minimize credit risk exposure of the banks in agricultural lending. As stipulated commercial banks in Ghana are required to comply with the regulations and guidelines underlined by the Banks and Specialised Deposit-Taking Institutions Act, 2016, Act 930. It follows Act, 930, and IFC (2018) therefore that, the credit information should be managed within certain legal structures to ensure that commercial banks and agricultural borrowers are protected to minimize credit risk exposure. Afriyie et al. (2018) examined the credit risk management system of commercial banks in Ghana using a regression model. In their findings, it was indicated that strict adherence to internal credit

⁸ Credit reporting has been described as the act of gathering information about the behaviour and make such information available whenever a decision is to be made regarding a borrower's application for new credit (Monye et al., 2020).

policies and loan administration procedures by commercial banks in Ghana effectively minimizes the exposure to credit risk exposure in agricultural lending. By section 2(1) of the Banking Act 673, the Bank of Ghana has been empowered to exercise supervisory and regulatory authority in all matters relating to the banking business and is responsible for promoting an effective banking system, dealing with the unlawful or improper practice of a bank as well as considering, and proposing reforms of the laws relating to banking business. Therefore, the BoG supervises commercial banks to follow the internal guidelines laid down by the banks, comply with laws and regulatory requirements governing the financial sector to avoid credit risk exposure associated with agricultural finance (BoG, 2020). Therefore, compliance with regulatory requirements requires reasonable due care during credit risk identification credit assessment, credit approval process, credit evaluation, credit risk policy implementation procedures, and the best strategies to mitigate credit risk exposure in agricultural lending. In ensuring compliance with internal guidelines, laws, and regulations in credit granting, banks must assess how restrictive covenants and credit insurance are effectively enforced. The following section gives more details.

3.3.7 Enforcement of Restrictive Covenants and Credit Insurance

This subsection discussed the empirical studies on the enforcement of restrictive covenants⁹ and credit insurance in the agricultural loan granting process. It is worth noting that restrictive covenants and credit insurance play crucial roles in credit risk management implementation strategies and must be well evaluated in credit granting. Bodla and Verma (2009) examined the credit risk management framework among banks in India using the exploratory, descriptive, and Chi-square test. Findings indicated that effective credit risk management requires the banks to effectively enforce all restrictive covenants arranged with the borrowers to minimize loan losses. Similarly, Kessey (2015) examined credit risk management practices of commercial banks in Ghana using explanatory and exploratory methods and found the enforcement of restrictive covenants to be significant in minimizing credit risk. Adding, Addae, Nyarko-Baasi, and Tetteh (2014) in a study on the effects of exchange rate movements on Ghanaian banks using qualitative and quantitative techniques involving econometric models found that, restrictive

⁹ Restrictive covenant is a promise included in a contract or agreement that restricts one of the parties to a contract from doing something (Ryan, 2020). It is a promise included in a legal agreement that prevents one party to a contract from taking specific actions.

covenants are very significant in minimizing credit risk. In another development Odonkor (2018) evaluated credit risk management of Adansi rural banks in Ghana using descriptive statistics and indicated that banks in Ghana do not effectively enforce restrictive covenants and suggested that, borrowers should be made to sign bonds of good behaviour when accessing credits for agricultural activities. In other words, commercial banks would reduce credit losses if restrictive covenants on loans granted to agricultural borrowers are strictly enforced to facilitate repayment. However, this approach is only effective when the commercial banks are few. In the existence of many commercial banks chasing few borrowers where borrowers can easily switch presence, strict regulations including bonding are relaxed. Further, a descriptive approach was used by Addae-Korankye (2014) to examine causes of loan default in microfinance institutions of Ghana and found that, adherence to the enforcement of restrictive covenants were recommended to effectively reduce the exposure to credit risk exposure in agricultural lending.

Insurance of loans is another strategy which commercial banks can use to mitigate future losses from credit risk exposure. The effect of possible losses from loans granted to borrowers in Ghana can be transferred to third parties through insurance as found by Odonkor (2018) in a study on Adansi rural bank in Ghana using descriptive statistics. Dlugosch, Klinger, Frese, and Klehe (2018) evaluated the personality-based selection of entrepreneurial borrowers in reducing credit risk in Kenya using descriptive statistics. The study found that loan losses would be minimized particularly through insurance cover among commercial banks in Kenya. Based on this finding, the effects of credit risk would be easily transferred to third parties through insurance and prevents commercial banks from suffering entirely from credit losses associated with agricultural lending. Acharya, Almeida, Ippolito and Perez-Orive (2021) found that insurance schemes for agricultural activities are very crucial in mitigating credit risk associated with agricultural lending. Loans are insured and possible risk is transferred to insurance houses to mitigate unexpected losses from loans. This implies that risk transfer through insurance is one of the best implementation practices that mitigate the negative effect of credit risk particularly in agricultural finance. By insuring loans, commercial banks do not suffer the effects. The borrowers and third parties bear the cost when the loans go bad.

3.3.8 Remarks on findings on the effectiveness of the implementation of credit risk management policies

Commercial banks in Ghana have comprehensive credit risk management policies. Even though the credit risk management policies have been put in place by the commercial banks, these banks would continue to face credit risk management challenges if the policies are ineffectively implemented (BoG, 2021). It is therefore required that commercial banks effectively and efficiently implement credit risk management policies in the process of granting loans to agricultural borrowers to improve loan performance and reduce credit losses (Apanga et al., 2016). However, commercial banks are faced with implementation challenges in agricultural finance resulting in loan losses and high credit risk (Ascui & Cojoianu, 2019; Olowa & Olowa, 2011). Therefore, this study calls on commercial banks to dramatically focus and improve upon their implementation practices to minimize credit losses and increase credit risk exposure reduction in agricultural lending. Effective implementation of credit risk management policies improves loan repayment among agricultural borrowers and reduces credit losses (Mwangi & Muturi, 2016). Improvement in loan repayment among commercial banks and intense credit scoring of agricultural borrowers provides a reliable means of selecting trustworthy borrowers to reduce the credit risk associated with agricultural finance. The subsequent section 3.4 highlighted empirical studies on credit risk mitigation strategies adopted by commercial banks to reduce credit risk associated with agricultural lending.

3.4 Empirical Studies on Credit Risk Mitigation Strategies in Agricultural Lending

The section discoursed the empirical studies on credit risk mitigation strategies that are used by commercial banks to mitigate credit risk in agricultural lending. Because credit risk is inevitable in agricultural finance, effective risk mitigation strategies are essential in mitigating credit risk in agricultural finance. This is because commercial banks enable to maximise the benefits of risky loans and minimising the adverse effects associated with credit risk in agricultural lending. BoG's (2019) banking sector report indicated commercial banks must adopt appropriate and best credit risk mitigation strategies to survive and grow. Also, Khalid and Amjad (2012) evaluated the degree to which Islamic banks in Pakistan use risk management practices to deal with different types of risk using a regressing model and found risk mitigation strategies to be significant in credit risk reduction. Likewise, Nwude and Okeke (2018) evaluated the impact of credit risk management on the performance of Nigerian banks using the OLS regression model and found

that credit risk mitigation strategies have a significant impact on loan default. This implies that commercial banks in their operation should have adequate knowledge of credit portfolio structure and must ensure the best mitigation strategies are adopted to minimize credit losses in agricultural lending. Some of the strategies discussed in this section include identification of loans with distress signals, review of loan granting processes, monitoring, maintaining good portfolio quality, review of employees' skills, training of credit officers, collateral monitoring, documentation of credit-related transactions, loan repayment review, communication of credit risk management policies and credit guarantee schemes among others. These strategies are subsequently grouped into five broad subsections and empirically discussed. The first subsection 3.4.1 highlighted the empirical studies on credit risk mitigation strategies in loan granting; the second subsection 3.4.2 elaborated empirical studies on collateral monitoring, documentation of credit-related transactions, and review of credit risk management process; and the last subsection 3.4.3 elucidated empirical studies on the communication of credit risk management guidelines and credit guarantee schemes.

3.4.1 Credit Risk Mitigation Strategies in Loan granting

This subsection described the empirical studies on credit risk mitigation strategies in loan granting. This comprised of factors such as the identification of loans with distress signals, review of loan granting processes, monitoring, maintaining good portfolio quality, review of employees' skills, and training of credit officers. Yin, Meng, and Sha (2020) investigated loan defaults associated with agricultural finance in China using logit regression and found that, distress loans associated with agricultural lending were higher than non-agricultural related loans. The study further indicated that regular assessment of loan with distress signals significantly reduce loan losses among banks. According to Brunner and Krahen (2008), in a study conducted on multiple lenders and corporate distress in Germany using descriptive analysis, it was found that identifying the severity of the distressed loans significantly reduces credit risk. It further indicated that loan distress can be reduced through pool lending¹⁰ among commercial banks. In another instance, Netzer, Lemaire, and Herzenstein (2019) investigated the identification signals of bad

¹⁰ Pool Lending among commercial banks has been described as a formal contractual arrangement in which lenders pool their individual claims vis-à-vis particular borrowers who are in distress in order to coordinate their decision making (Brunner & Krahen, 2008).

loans among loan applicants in Columbia using text-mining and machine learning tools to automatically process and analyse raw text. The study found that borrowers consciously or not leave traces of their intentions, circumstances, or personality traits in the texts they write during the loan application process and these texts can predict whether or not, they will be able to repay the loans. The study also indicated that loan requests written by potential defaulters are most likely to include distress signal words like family relations, mention of God, general hardship of the borrowers, pleading lenders for help, and short-term-focused words. The Indian banking sector is no different. Sanjeev (2007) investigated the bankers' perception of the causes of bad loans in India. The study adopted the descriptive and explanatory approach and found that poor credit scoring skills of credit managers have been found to significantly influence bad loans. Also, Owojori, Akintoye, and Adidu (2011) studied the challenges of risk management among Nigerian banks in the post-consolidation era employing descriptive statistics. Based on information gathered from the available liquidated banks, evidence indicated that a major cause of loan distress of the banks was the inability to identify loans with bad signals. They further stressed that lack of sound management practices involving efficient management, and monitoring of loans with distress signals results in credit losses, and impair the performance of banks. This suggests that company directors and senior management must actively identify all the processes involved in loan granting to agricultural borrowers and influence credit decisions in banks to ensure early detection of distressed loans before they go bad. In a study to examine the risk management practices among Islamic banks in Pakistan, Khalid and Amjad (2012) used the incremental regression model and found that loans with potential credit weaknesses that can cause repayment problems will result in bad loans among Islamic banks in Pakistan (Khalid & Amjad, 2012). In a related study on the determinants of bad loans in the banking sector of Ghana deploying the factor analysis model, Asantey and Tengey (2014) found that distressed loans affect the lending potentials of the banks. Addae-Korankye (2014) studied the Ghanaian banking sector and found that the agonies and frustrations of distressed loans can be avoided through quality and effective loan evaluation; and supervision. This implies that, as the loan is given out, continuous supervision can spot early distress signals and reduces credit risk exposure associated with agricultural finance, through effective monitoring and thus improves loan growth of the commercial banks. Nevertheless, if credit scores come in lower than expected,

the loan officers can recommend ways to recover them and reduce the cost of lending to agricultural borrowers.

Furthermore, a regular review of the loan granting process and monitoring are some of the strategies discussed. Muriithi et al. (2016) employed the fixed-effect model and generalized methods of a moment to examine the effects of credit risk on the financial performance of commercial banks in Kenya. It was found that well-established approval processes for granting new loans, monitoring, and the extension of existing credits in agricultural finance are highly regarded as very important strategies in mitigating credit risk. Pham (2021) found that improper monitoring could lead to the diversion of loans for different purposes other than for agricultural use and can cause serious credit risk implementation challenges among banks. In a study to determine the causes of loan default among microfinance banks in Nigeria employing descriptive and inferential statistics, Asongo and Adamu (2014) established that inadequate supervision and monitoring of the loan granting process cause high loan default. It was further stated that irregular review of the credit granting process, credit risk assessment and analysis by management could cause default problems. This argument follows a similar study conducted on Indian banks by Chilukuri and Rao (2014) using descriptive statistics. The study found that rigorous loan review mechanisms serve as the key to determine the soundness and financial health of Indian banks. This signals that even if commercial banks have a well-established loan granting process and do not regularly review these processes, the possibility of defaults among agricultural borrowers would occur. Conforming to Chilukuri and Rao (2014), Addae-Korankye (2014) carried out a study to determine the causes of loan delinquency in Ghana employing the use of descriptive and explanatory approach to analyse data and found the causes of loan defaults to include lack of monitoring and irregular review of loan granting processes. However, the findings of Addae et al. (2014) were based on activities of microfinance banks and do not entirely represent activities in commercial banks. The findings however suggest that regular review of loan administration processes and monitoring such as regularly visiting borrowers' businesses have high potentials of reducing credit risk associated with agricultural lending. It also suggests that competent and qualified staff should be employed to handle the lending activities of banks. Derban et al. (2005) examined loan repayment performance in community development in the UK using a regression model and descriptive statistics. It was found that regular monitoring of borrowers is very crucial as current and potential exposures of credit risk

may change with the passage of time as well as movement in key underlying variables (Derban et al., 2005; Muhammad et al., 2018). Likewise, Muhammad et al. (2018) evaluated credit risk management practices among banks in Pakistan. Using regression model and descriptive statistics, it was found that regular monitoring should involve frequently contacting borrowers, creation of an environmental friendly relationship where the banks are seen as problem solvers and reliable advisers. The study further found that, developing a reliable supportive culture to assist borrowers whenever they are in a difficult situation; examining the flow of borrowers' business; regular review of borrowers reports; on the site visit; and updating the credit file of borrowers' ratings assigned at the time of granting the credit. Additionally, Vashishtha (2014), carried out a study on borrowers' disclosure response following covenant violations employing regression discontinuity design and found that disclosure reductions of borrowers are higher when the monitoring of banks in Pennsylvania is more intense. Equally, Cerqueiro, Ongena, and Roszbach (2016) found in a study on bank loans and monitoring employing descriptive statistics that monitoring of borrowers allows Swedish commercial banks to demand additional collateral from borrowers at increased risk of distress and reduces loan losses.

Furthermore, a review of employees' skills and training of credit officers are some of the strategies that can be adopted by commercial banks in Ghana to mitigate credit risk in agricultural lending. Harelimana (2017) attempted to highlight the impact of risk management on the financial performance of banks in Rwanda and found that regular training of credit officers and review of their skills enables them to develop professionally and offer better service quality to maximise commercial banks' profitability to counteract credit risk exposure, particularly in agricultural finance. Likewise, Addae-Korankye (2014) in a study on loan defaults among banks in Ghana using descriptive analysis that, training of credit officers significantly mitigates against credit risk exposure of banks. The study further indicated that well experienced and trained credit officers are engaged by commercial and the skills of the credit officers reviewed for regular training needs to manage credit risk associated with agricultural lending. Correspondingly, BoG (2018) indicated that strategic plans of commercial banks should critically focus on developing and training key credit staff as part of the short and long-term strategic goals of the banks to reduce credit risk associated with agricultural finance. (BoG, 2018; Boguslauskas & Mileris, 2009) carried out a study on estimation of credit risk by artificial neural networks model in Lithuania using probit and logit models. The results found regular training of credit staff to be

significant in mitigating credit risk. Likewise, Beisland, D'Espallier, and Mersland (2019) evaluated the geographical diversification of credit risk among microfinance institutions in Norway. Findings showed that a negative correlation between credit officers' experience and the provision of small loans, loans to young clients and loans to clients with disability. In another study by Maitah, Zedan, and Shibani (2012) researched the factors that affect credit officers in the credit decision of Libyan commercial banks using descriptive statistics. The study found that poor qualification of credit officers is the major cause of weak usage level of financial analysis in the decision-making process of evaluating illegible borrowers. Also, in a study conducted on credit risk management practices among banks in Pakistan by Khalid and Amjad (2012) employing the use of regression model, it was revealed that lack of experienced and trained loan officers can create loan recovery problems among Islamic banks in Pakistan. In another jurisdiction like Namibia, a study was carried out agricultural financial constraints by Amadhila and Ikhide (2016) using purposive judgement sampling, noticing and thinking approach. It was indicated that, credit officers should be regularly trained to gain more experience on credit and loan recovery policies and administration to mitigate credit risk exposure of banks in Namibia. Afriyie et al. (2018) in a study on credit risk management among Ghanaian commercial banks employing interviews and document analysis and found that, instead of identifying the strategies of commercial banks, the competency of credit officers is required to mitigate credit risk. They confirmed previous studies conducted by as well as Dexu and Wenlong (2016) which identified the quality of staff as a way of minimizing the costs of credit in a study on financial inclusion and exclusion in China using descriptive statistics. It was again indicated that credit officers should be identified with credibility, professionalism, knowledgeable friendly, and business-minded. In furtherance, Kirschenmann (2016) in a study on credit rationing in a small firm bank in Philadelphia using the explanatory and descriptive approach that, credit officers are expected to ask critical and valid questions and gather relevant data about the borrowers and their banking history. This enables loan officers to develop initial observations about borrowers' behaviour for evaluation.

Additionally, regular reviews of borrowers' performance profiles and credit reports are some of the credit risk mitigation strategies that can be adopted by commercial banks and have been subsequently discussed. In one development, Nawai and Shariff (2012) researched microfinance institutions in Malaysia using multiple logit regression models and indicated that

the inability of microfinance institutions to review and mount pressure on borrowers to repay their loans results in repayment delays and significantly affect the repayment performance of the borrowers. It is however noted that Nawai and Shariff (2012) based their findings on microfinance institutions and similar studies conducted on banks could have produced different results. In another development, Minnis and Sutherland (2017) assessed financial statements as a monitoring mechanism against loan losses and found regular financial statements assessment of borrowers as a panacea to uncovering borrowers' performance in the United States. Afriye et al. (2018) carried out a study on credit risk management systems of commercial banks in Ghana employing the use of descriptive statistics and found that regular review of borrowers' business operations, cash flow verification, loan diversification, and credit reminders significantly minimize the effects of credit risk exposure of the banks. They also indicated that regular review of borrowers' credit reports, performance profile, and portfolio quality are some of the strategies used in mitigating credit risk exposure of banks. As indicated by Kirschenmann in a study on credit rationing in a small firm bank in Philadelphia using the explanatory and descriptive approach, regular factory, and site visits as well as the provision of consultancy, and technical support to borrowers on request are very essential in mitigating credit risk. They also discovered that risk is minimized in a well-established environment where borrowers' performance is regularly reviewed, and monitored under established control policies. This approach aims at reducing credit loss and improve the cash flow of banks to encourage agricultural lending as a viable business. It was pointed out in a study conducted in Ghana on rural banking and agricultural finance, that heads of departments be involved during the borrowers' performance review and credit reports to mitigate credit risk associated with agricultural finance. It was further noted that the credit risk department inspects and collects repayments due from agricultural borrowers, assesses their progress, and frequently updates files to reduce credit risk exposure. Using the panel regression model, Abiola and Olausi (2014), concluded that credit risk management has a significant impact on the banks' profitability in Nigeria. They opined that the strategies such as regular review of borrowers' performance used in managing risk by senior management, direct the performance and success of banks. In an attempt to make a prudential analysis of the credit risk of Indian public banks, Bhattacharya and Roy (2008) cautioned banks to be more vigilant in loan screening to avoid the possibility of too many new defaulters on freshly disbursed loans to borrowers. Therefore, a critical examination of borrowers' credit reports, credit

administration, on process, loan granting process, documentations for credit-related transactions, and loan distress signals by commercial banks will prevent possible future losses and improve banks' performance. The findings of Gekara (2017) evaluated credit risk management strategies of banks in Kenya adopting a descriptive statistics model. The study found, that credit risk management strategies such as review of borrowers' performance and credit reports, credit rating, portfolio risk control, and security perfection positively impact the performance of Kenyan commercial banks. The Oxfam Great Britain report produced by Doran et al. (2009) on the missing middle in agricultural finance indicated that banks must develop new and more refined strategies for managing credit risk in agricultural finance. Also, the findings of Akele and Stephen (2014) on risk management and financial performance of banks in Nigeria by adopting the panel data analysis technique found that banks must develop strategies such as regular review of borrowers' performance and credit reports, credit-scoring, early-warning signals, portfolio risks of fixed income securities to manage risks in agricultural finance. Examining the effects of credit risk on the profitability of commercial banks in Kenya, Wanjohi (2016) using the descriptive design and panel regression model found the review of borrowers' character, collateral, capacity, capital conditions as very significant in determinants of banks profitability and credit exposure reduction associated with agricultural lending. The study further indicated a significant positive relationship between performance review, credit appraisal, credit monitoring, debt collection, credit risk governance practices, and profitability of banks. Following, Philippon (2015) evaluated the financial industry of US and Canada using descriptive approach and posited that effective screening and review of borrowers' credit reports, should be strategically implemented to mitigate credit risk exposure in agricultural finance. Collateral monitoring, documentation of credit related transactions and review of credit risk management practices are some of the credit risk mitigation strategies discussed in details in subsection 3.4.2.

3.4.2 Collateral Monitoring, Documentation of Credit-Related Transactions, and Review of Credit Risk Management Practices

This subsection expounded empirical studies on collateral monitoring, documentation of credit-related transactions, loan repayment review as credit risk mitigation strategies adopted by commercial banks to minimize credit risk in agricultural lending. Hong and Zhou (2013) evaluated the collateral arrangement and finance problems of small and medium enterprises in China. The study the descriptive approach and identified collateral monitoring as a key factor

used to mitigate credit risk in China. Using the switching regression model to estimate the performance of a rural credit market in Peru, Guirkinger and Boucher (2008) identified collateral monitoring and proper record keeping of credit transactions as some of the best strategies that can be used to reduce the credit risk exposure of banks. Also, Minnis and Sutherland (2017) conducted a study on the use of financial statements as a monitoring mechanism using descriptive statistics and found that frequent financial reporting can be used to effectively monitor collateral and reduce credit risk in the U.S. In furtherance, Sackey (2018) used the probit model found in a study to assess discrimination against the agricultural sector in credit rationing behaviour of Ghanaian commercial banks that, collateral monitoring is an effective strategy in minimizing credit risk of the banks. It was further indicated that collaboration with other lenders, proper documentations reduce credit losses. In another development, Ollennu (1962) in his study on customary land law in Ghana indicated that, because 80 percent of the land in Ghana is customarily owned the agricultural sector experienced limited access to credit facilities as a result of lack of collateral in the form of land. Daum and Birner (2017a) assessed the neglect of governance challenges in agricultural mechanization in Ghana. Using key informant interviews and expert opinion, the study found that, commercial banks do not lend to agricultural borrowers who do not possess title deeds to lands and that banks should finance the borrowers engaged in agricultural activities to acquire farm equipment and register such equipment in joint ownership under strict monitoring until the loan is fully repaid. Moreover, the findings of Philippon (2015) in his evaluation of the financial industry of the U.S and Canada using descriptive analysis indicated that an effective banking system requires repayment of loans by borrowers through effective monitoring of collateralized transactions and proper documentation of credit-related transactions to reduce the credit risk exposure of the banks. Comparatively, Olowa and Olowa (2017) in a Tobit analysis of factors influencing loan repayment in Nigeria found, effective monitoring of collateralized transactions to be very significant in credit risk reduction. Likewise, using data gathered from the Swedish company registration office and employing differential and descriptive statistics, Cerqueiro et al. (2016) conducted a study on collateralization, bank loans, and rate. Findings indicated that that collateralized and proper documentation of credit-related transactions among countries such as the United States, United Kingdom, and Australia are good strategies to mitigate credit risk exposure of banks but must be regularly monitored to make them effective. On one hand, also, Niazi, Azim, and Ahmed (2012) carried out a study in Pakistan

on bank performance enhancement and found that documentation of credit-related transactions is indispensable to timely recovery of loans from borrowers and has a significant influence on banks performance. On the other hand, Sidhu and Gill (2006) descriptively evaluated agricultural credit and indebtedness in India and established that documentation requirements are complicated, time-consuming, cumbersome, and raise the cost of borrowing for agricultural borrowers and this affects the loan recovery rate among commercial banks. The above evidence is an indication that, commercial banks must effectively monitor all collateralised and pay more attention on the documentation of credit related transactions to minimize defaults among agricultural borrowers and reduce credit risk exposure of the banks.

Further, loan repayment review and assessment of loan portfolio quality in commercial banks are some of the credit risk mitigation strategies used in mitigating credit risk in agricultural lending and have been discussed in this section. Yeung (2009) examined the determinants of lending decisions among state-owned commercial banks in China employing descriptive analysis. Results indicated that banks in China place more importance on loan repayment quality in making lending decisions to minimize credit losses. In one instance on the evaluation of the financial industry of the U.S and Canada using the descriptive approach, Philippon (2015) indicated that credit departments must regularly review the repayment progress of borrowers to enforce effective repayment of loans on time. It was further posited that repayment activities and plans of borrowers must be regularly reviewed by the credit department to identify loans with potential credit weaknesses that might cause repayment challenges. Mwangi and Muturi (2016) conducted a study on the impact of credit risk management on loan repayment performance of commercial banks in Kenya. Using both qualitative and quantitative techniques, results indicated that, credit risk management practice such as loan repayment review in commercial banks, affects loan repayment performance; and that regular review of loans improves debt collection among borrowers and enhances loan repayment. Similarly, Pasha and Negese (2014) used a binary logistic model to evaluate loan repayment performance among banks in Ethiopia found that ineffective loan repayment review increases credit losses. Adopting the logistic model to estimate the determinants of loan repayment performance of Ethiopian microfinance institutions, the findings of Haile (2015) also indicated that, borrowers' perception of loan repayment significantly influences loan repayment. Warue (2013) evaluated the effects of bank-specific variables and microeconomic factors on nonperforming loans among commercial banks in

Kenya using the panel regression model. It was detected that there exists a significant relationship between bank-specific factors including loan review and loan repayment among Kenyan commercial banks. The study also indicated that commercial banks must frequently review and establish repayment capabilities of the borrowers to reduce credit losses. In other words, must regularly review the loans granted to agricultural borrowers to enhance repayment of the loans and reduce credit losses. Vividly, a study was undertaken by Rufo and John (2017) using descriptive analysis and bond estimator indicated, the overall quality of the loan portfolio should be assessed on a timely basis to identify loans with bad signals to inform management on strategies to take to reduce loan losses. This implies that Identification of loans with bad signals would be achieved and increase the portfolio quality of loans if borrowers are reviewed for progress in loan repayment. This means that, loan portfolio quality assessment is essential in discovering possible problem loans and that, assessment of loan portfolio quality should be done by an experienced or senior officer to mitigate credit risk associated with agricultural lending. Kimotho and Gekara (2016) further indicated descriptively in a study on the effects of credit risk management practices that, effective screening of loans and appraisal of borrowers are critical in the assessment of portfolio quality to mitigate credit risk exposure. On the contrary, Love and Ariss (2014) conducted a study on a panel analysis of economic shocks and loan portfolio quality in Egypt using the panel vector autoregressive method and loan portfolio quality in a multivariate framework. The study found that even though screening and appraisal are critical in ascertaining loan portfolio quality, higher lending rates may create adverse selection problems and negatively affect the quality of the portfolio among banks. Similar, the findings of Onuko, Muganda, and Musiega (2015) in a study on the effects of credit risk management on loan quality of commercial banks in Kenya further found loan pricing to significantly influence loan portfolio quality and that commercial banks should charge moderate interests on loans granted to agricultural borrowers to effectively increase portfolio quality of the loans and reduce credit risk associated with agricultural finance. Also, Cucinelli, Gai, Ielasi, and Patarnello (2020) used an unbalanced panel of 73 Italian banks over 7 years employing a panel data regression to detect the determinants of bad loans. The study found that establishing a unit or office by banks to constantly manage, assess, and monitor impaired or bad loans increases loan performance and loan portfolio quality of the banks. In an empirical analysis on the role of board monitoring and loan portfolio quality measurement, Stefanelli and Cotugno (2012) found

weaknesses of board role in monitoring the loan portfolio quality of Italian banks and increases credit risk exposure. However, the regression results of Magali (2014) portrayed in a study on loan portfolio management in Tanzania found that, loan portfolio quality is significantly influenced by the size of the loan granted to agricultural borrowers. Besides, Agasha, Monametsi, and Feela (2020) used content analysis, stated that regular client/ borrower engagement such as loan portfolio review influences loan performance and portfolio quality and subsequently reduce credit risk among microfinance institutions in Uganda. It implies that commercial banks must consistently assess the portfolio quality loans granted to agricultural borrowers to improve loan performance and reduce credit risk exposure of the banks.

Additionally, some other strategies used by commercial banks in mitigating credit risk exposure associated with agricultural finance include regular review of credit risk management practices and loan administration process. Afande (2014) examined how commercial banks adopt techniques and credit risk management in mitigating credit risk in Kenya. Using a descriptive approach, it was discovered that, effective review of credit risk management practices and loan administration procedures are significant strategies used to mitigate credit risk exposure, particularly regarding agricultural finance. Furthermore, Bilal and Baig (2019) investigated the practices and processes in credit risk mitigation to avoid agricultural credit failures among banks in Pakistan. Adopting the descriptive approach, the study found serious risk management practice problems leading to higher loan delinquency in agricultural credit. In other words, the formation of credit risk management policies that highlighted the scope and how commercial banks' credit facilities are allocated, the establishment of effective administration systems with adequate credit control, support of top management, clear communication of credit management guidelines within credit departments, and screening of potential borrowers are some of the risk management practices that effectively influence credit risk management systems used by commercial banks and must be regularly reviewed to make them effective. Also, Norman, Hossain, and Pervin (2015) investigated credit risk management strategies among private commercial banks in Bangladesh using a descriptive approach. The study found regular review and monitoring of loan management practices, and frequent reminders to agricultural borrowers if the principal and interest remain unpaid for some time are significant in mitigating credit risk. The study also found that frequent review in borrowers' liquidity, employment of trained staff, and the use of information technology support systems in credit risk analysis are some of the

best credit risk management practices used to minimize credit risk and improve the performance of commercial banks. The World Bank Report (WBR, 2013) indicated that banks have to undertake a consistent review of risk management and loan administration practices before and after the occurrence of credit risks to effectively control agricultural credit risk and minimize credit losses. Moreover, an investigation on the cyclical effect of rapid credit growth and lending behaviour of banks in Italy by Doriga (2016) using panel regression model found that credit risk resulting from credit losses can be reduced greatly if banks undertake a regular and effective review of loan administration procedures and the business of borrowers for performance. In an empirical study conducted to investigate the quantitative effects of credit risk on the performance of commercial banks in Nigeria using panel data regression, Funso, Kolade, Oke, and Ojo (2012) opined that the effect of credit risk on the performance of banks measured by ROA of the banks is cross-sectional invariant. The study again postulated banks to build up their capacity to regularly review credit risk management and loan administration practices to reduce credit risk associated with agricultural lending. Adding, Kelsey (2015) revealed that poor review in credit risk management practices constitutes the factors responsible for high credit losses. In a similar vein, Lagat et al. (2018) used a regression model to examine the effects of credit risk management practices of the lending portfolios among savings and credit corporations in Kenya. The study found poor review as a potential cause of loan delinquency. However, their finding was based on evidence from savings and credit corporations and not specifically banks which in this context are usually larger and bigger. Notwithstanding, the findings provide open information for banks to emulate and minimize credit losses. There is therefore the need to create an interconnected system and interdependent method for deliberate action to curtail risk and uncertainties in credit activities. Implying, specific processes in credit risk management which include, identification of risk factors, assessing likely consequences of risk factors that are identified, and choices of strategies adopted by management in mitigating the effects of identified risk associated with agricultural finance. Examining credit risk management framework among Chinese rural commercial banks, Y. Wang, Wang, and Wang (2017) explored credit risk management framework for rural commercial banks in China using the qualitative approach. It was specified that the existing Credit risk management tools and practices do not meet rural commercial banks' requirements because their main clients are mostly agricultural whose financial data and credit rating are not readily available. It means therefore that, commercial

banks must regularly review all practices and loan administration procedures in agricultural lending to reduce credit risk exposure in agricultural lending. There should be clear communication of the credit risk management guidelines as well as credit guarantee schemes in the credit risk mitigation process. The following subsection 3.4.3 described the empirical studies on credit risk management guidelines and credit guarantee schemes in details.

3.4.3 Communication of Credit Risk Management Guidelines and Credit Guarantee Scheme

The subsection highlighted the empirical studies on the communication of credit risk management policies and credit guarantee schemes in the advancement of loans for agricultural purposes. The significance of the empirical studies on the communication of credit risk management guidelines and the adoption of credit guarantee schemes¹¹ as strategies used to mitigate credit risk exposure associated with agricultural finance in commercial banks cannot be over-emphasized. It unveils the arguments from various sources that underpin the purpose of this study. Communication of credit risk management guidelines among credit officers of commercial banks has been deliberated by various scholars like Asfaw and Veni (2015); Khalid and Amjad (2012); Ključnikov and Belás (2016); Luqman (2014); Mengze and Wei (2015); and Romanova (2012). In a comparative study on credit risk management practices among Chinese state-owned banks using the logit regression model, Mengze and Wei (2015) indicated that the establishment of a clear reporting structure and timely communication of credit risk management guidelines are fundamental strategies in the determination of bad loans. Affirming, Romanova (2012) evaluated banking lending and crisis in Latvia using face-to-face interviews. Findings showed that the failure to communicate credit risk management guidelines is the possible persistent cause of bad credit risk management practices among banks resulting in high defaults. It was further found that credit risk management guidelines must be clear and regularly communicated to all individuals involved in the risk management process to minimize credit losses. Similarly, Asfaw and Veni (2015) conducted an empirical analysis of credit risk

¹¹ A credit guarantee scheme provides third-party credit risk mitigation to lenders through the absorption of a portion of the lender's losses on the loans made to SMEs in case of default, typically in return for a fee.

Credit guarantee schemes provide guarantees on loans to borrowers by covering a share of the default risk of the loan. In case of default by the borrower, the lender recovers the value of the guarantee. Guarantees are usually provided against a fee, covered either by the borrower, the lender or both (Saito & Tsuruta, 2018).

management practices of Ethiopian commercial banks using descriptive analysis and found among others that, internal communication is a major credit risk mitigation strategy among commercial banks. On the contrary, Ključnikov and Belás (2016) employed regression and descriptive approach to examine debt finance and credit risk management among banks in the Czech Republic and found that, the level of knowledge of conditions under which commercial banks provide loans is relatively low and that credit conditions among banks are not transparent. In another study on risk management among Islamic banks in Pakistan, Khalid and Amjad (2012) adopted the regression model and indicated that, the inability to provide management with accurate and timely credit quality portfolio information would likely, lead to poor or wrong credit decisions among Islamic banks in Pakistan. For banks credit risk management to be effective therefore, credit risk management guidelines must be communicated among credit officers in a timely manner in agricultural finance. This supports the findings of Luqman (2014) in a study on credit risk and performance of Nigerian banks using panel data model and found that, the responsibilities of credit risk management practices and guidelines must be communicated among responsible officers as well as the assignment of accountability to minimize credit risk exposure in agricultural lending. Similarly, Apanga et al. (2016) in a study on credit risk management practices of Ghanaian listed banks using semi-structured interviews and descriptive statistics established that credit risk management guidelines should be regularly communicated to the board and management to effectively curtail credit losses in agricultural finance. This necessitates that key players in the credit risk management process must regularly provide reliable and timely information on loan portfolios to risk managers to plan and strategize ways to mitigate any adverse effect associated with credits granted to agricultural borrowers.

Credit Guarantee Schemes by government or credit associations are the last credit risk mitigation strategy expounded in this section. Simply put, commercial banks can resort to credit guarantee schemes as part of the credit risk mitigation strategies in agricultural finance. Credit guarantee schemes have been given a negative critique by scholars like Dvouletý, Čadil, and Mirošník (2018); Saito and Tsuruta (2018). An examination by Saito and Tsuruta (2018) on information asymmetry in enterprise credit guarantee schemes in Japan using regressive and descriptive approaches indicated that, credit risk guarantee corporations cannot differentiate low risk from risky borrowers and that credit guarantee schemes usually attract a larger proportion of risky borrowers resulting in inefficient resource allocation and hence likely to increase credit

risk exposure in agricultural finance among commercial banks. In another argument, Dvouletý et al. (2018) examined whether banks supported by credit guarantee schemes perform better than those not supported by the scheme fund in Central and Eastern Europe employing the use of propensity score¹² matching approach. Even though the study results portrayed a positive change intangible assets of both supported and non-supported banks, they could not reliably substantiate whether or not banks supported by the credit guarantee schemes performed better than those that were not supported by the scheme. On the other hand, however, Obilor (2013) used a regression model to examine the impact of credit guarantee schemes fund and commercial banks' credit on agricultural sector performance in Nigeria. Findings of the study from the econometric analysis revealed that agricultural credit guarantee scheme funds produced a significant positive effect on agricultural productivity and reduce credit losses. In the same vein, Egwu (2016) assessed the impact of agricultural finance on agricultural output among Nigerian banks using the Ordinary Least Square regression technique and found that commercial banks credit and agricultural guarantee scheme fund loan to Nigerian's agricultural sector were significant to the agricultural sector output percentage to gross domestic product and reduces credit losses. This implies that some commercial banks resort to the use of credit guarantee schemes in mitigating credit risk exposure. Wubin, Arthur, and Agyapong (2020) explored credit-granting schemes in Ghana using descriptive statistics and identified regular use of credit guarantee schemes as one of the efficient strategies of mitigating credit risk in agricultural finance. Norman et al. (2015) descriptive statistics in a study on credit risk management strategies among commercial banks in Bangladesh and posited that banks must give more attention to third-party guarantees, accurate loan pricing, and collateralization to reduce credit risk and prevent losses arising out of credit exposure. Yoshino and Taghizadeh-Hesary (2018) investigated the optimal credit guarantee ratio enterprises' finance in Asia using ratios and descriptive analysis. The study indicated that, by regular use of credit guarantee schemes, credit associations and the government serve as guarantors in the facilitation of the loans to borrowers and agree to pay off lenders a significant part of the loan in case of default. This is because some banks can make gains in a bad economic environment. Therefore, credit

¹² Propensity Score is the probability that unit with certain characteristics will be assigned to treatment group to eliminate bias (Dvouletý et al. 2018).

guarantee schemes can effectively reduce the credit risk exposure of commercial banks in Ghana with proper banking behaviour. Daum and Birner (2017) examined the neglected governance challenges of agricultural mechanisation in Africa using Ghana as a case. Adopting the qualitative approach, it was revealed that, with a high-interest rate of about 35 percent to 42 percent to the agricultural sector, banks can cooperate with other entities such as DANIDA¹³ through credit guarantee schemes to address the challenges of credit risk associated with agricultural finance in Ghana. However, a shortfall of this argument is the fact that loans granted under the DANIDA-aided scheme are only limited to farmers providing tractor services to small agricultural farmers and not general or larger agricultural activities. To effectively reduce credit exposure in agricultural finance, commercial banks should adopt the best strategies as suggested above. The use of the best strategies in credit risk mitigation in commercial banks in Ghana will require the effort and support of the board and senior management of the banks. The purpose of this study is to identify the factors that constitute the best strategies used in mitigating credit risk exposure in commercial banks.

3.4.4 Remarks on findings on Credit Risk Mitigation Strategies

The empirical studies discussed in section 3.4 opens up a broad discussion on the need to adopt adequate and best strategies credit risk management strategies to mitigate credit losses associated with agricultural lending. Even though credit risk mitigation strategies become an integral part of commercial banks' overall risk mitigation strategy in minimizing credit risk associated with agricultural lending (Agasha, Monametsi, & Feela, 2020), Ghanaian commercial banks have some credit risk mitigation challenges that need to be improved. These include regularly identifying loans with distressed signals; regular review of loan granting process; regular and effective monitoring; the need to maintain good agricultural loan portfolio; collateral monitoring; documentation of collateralized transactions and improvement in the communication of credit risk management guidelines. This implies that commercial banks' credit risk mitigation in agricultural finance would depend on the strategies adopted by the banks in controlling and minimizing credit losses. This is because, sound credit risk mitigation strategies can boost the

¹³ **DANIDA** refers to the Danish International Development Agency which cooperate with three banks in Ghana where half of the default risk is covered to allow the banks to reduce their interest rates to agricultural activities in order to minimise credit risk exposure of the banks (Daum, and Birner, 2017).

performance of agricultural borrowers' and confidence in commercial banks thereby reducing credit losses (Taiwo et al., 2017). Banks must therefore make the best strategic choice to minimize credit losses in agricultural lending and reduce credit risk (Bülbul et al., 2019). Implying, commercial banks must adopt the best strategies that will minimize credit risk exposure of the banks in agricultural finance.

3.5 Summary and Concluding Remarks

The chapter discussed empirical studies on credit risk management practices. The chapter is structured into 5 main sections namely the introduction, empirical literature on credit risk identification methods, the empirical literature on the effectiveness of the implementation of credit risk management policies, the empirical literature on credit risk mitigation strategies, and a summary of the chapter. Empirical studies have revealed that, even though the survival of commercial banks depends on effective credit risk management practices, only a few studies have investigated risk management practices of commercial banks specifically relating to agricultural finance. Most of the studies that were done on credit risk management practices in agricultural finance were conducted in the developed countries such as China, the US, Japan, and the UK among others. The few African studies concentrated on general risk management in agriculture, the impact of credit risk management, determinants of loan performance, and general risk management in banks. With agriculture being the backbone of many emerging economies, credit risk management practices adopted by commercial banks in agricultural finance have not received the desired attention in finance literature in Sub-Saharan Africa particularly Ghana. The import of this study, therefore, justifies the need to fill the aforementioned knowledge gap. Based on the above background, there is the need to carry out this research to empirically and objectively determine the best credit risk management practices adopted by commercial banks to minimize credit risk in agricultural finance to encourage agricultural lending as a viable business (Nwude & Okeke, 2018). The following chapter describes the methodological approach adopted by the researcher in this study. It involves the sources of data collection, population, sampling strategy, and models to achieve the objectives.

CHAPTER FOUR

METHODOLOGY AND DATA

4.1 Introduction

This section discusses the relevant methodology employed in the study. Choosing the relevant methodology in this study helped to illuminate the problem and achieve the objectives. To achieve this, the study adopted mixed methods of quantitative, and qualitative approaches involving the assessment of credit risk management practices adopted by commercial banks in mitigating credit risk exposure. In the quantitative approach, questionnaires were used to collect data from participants of commercial banks. The questionnaires were analysed quantitatively to identify credit risk as the initial objective. the second objective was designed to assess the effectiveness of the implementation of credit risk management policies; while objective three sought to evaluate the effectiveness of credit risk mitigation strategies adopted by commercial banks in agricultural lending.

To verify and triangulate the findings, the qualitative approach involved the use of in-depth interviews to gather data from participants purposively sampled. This trend also utilised document analysis to support the quantitative data. The qualitative data was analysed in themes to achieve objectives two and three. The study employed primary and secondary data which were assessed using different estimation techniques. This chapter describes the research paradigm, design, and approach in section 4.2; data sources in section 4.3; population and sampling in section 4.4; data analysis in 4.5; data quality and control in section 4.6. The chapter also describes the ethical considerations in section 4.7 and provides a conclusion in section 4.8.

4.2 Research Paradigm, Design and Approach

The pragmatic research paradigm was adopted to generate data. By the pragmatic worldview, the researchers adopted a mixed-method approach to collect both quantitative and qualitative data in a sequential manner (Creswell, Clark, & Plano, 2017). By using the pragmatic approach, the researcher is free to choose the best technique, method, or procedures that meet the needs and purposes of the research objectives (Creswell, 2014). The mixed methods, therefore, open the door to multiple methods and forms of collecting and analysing the data (Morgan, 2007). In this context, the study begins with a broad survey of credit risk management in agricultural

finance to generalise the results to commercial banks. The real focus is on quantitative data collection, open-ended in-depth interviews, and analysis of policy documents from the Central Bank of Ghana. The inquiry is convinced that data collected from diverse ways provides a more rigorous understanding of the research problem than either the qualitative or quantitative data alone.

The study uses explanatory, and descriptive research methods to explain key risk management practices in agricultural finance by commercial banks in Ghana. This method provides an in-depth investigation and insightful analysis of credit risk management practices in agricultural finance adopted by commercial banks in Ghana. It also opens up new specific questions for investigation through rigorous research (Bhattacharjee, 2012; Engel & Schutt, 2012). The study employs the convergent parallel mixed method. In this context, the researcher administers the questionnaires, reviews policy documents, and conducts in-depth interviews simultaneously and then integrates the findings in the interpretation of the results (Creswell, 2014; Creswell et al., 2017). This approach enables the researcher to compare different perspectives from both quantitative and qualitative data to arrive at efficacious conclusions. The use of the questionnaire was relevant in collecting data for the achievement of the three main objectives namely the examination of credit risk identification methods, assessment of the effectiveness of credit risk management policies, and the effectiveness of credit risk mitigation strategies adopted by commercial banks to minimize credit risk exposure in agricultural finance. The policy documents review provided a more detailed explanation for the comparison and evaluation of objective two. Also, the in-depth interviews complemented the questionnaires in collecting data necessary for the evaluation of objective two and three.

4.3 Population and Sampling

A population must be effectively represented in the selection of the sample size (Krejcie & Morgan, 1970). There are 23 commercial banks in Ghana (BoG, 2021). Four commercial banks, namely, Ghanaian Commercial Banks (GCB Ltd), Prudential Bank Ltd (PBL), Agricultural Development Bank Ltd (ADB), and Stanbic Bank Ghana Ltd (SBG) across Ghana were purposively selected for this study. The four commercial banks were purposively selected because they were the only banks that consented to participate in the research of this kind, at the time of this study. It should be noted that most of the banks in Ghana at the time this study

was conducted were not ready to consent to a research of this nature as some of them were going through internal restructuring resulting from the impact of the Covid-19 pandemic which affected banking operations in the country. Besides, the four selected banks were most appropriate for this study because they are widely distributed over the country and are some of the major leading banks providing agricultural lending with a market share of 73 percent of the agricultural loan portfolio in Ghana (BoG, 2020; Ofori-Nyarko, 2017). Credit managers and officers were purposively targeted in the four selected commercial banks. The purposive sampling in this study was designed to select participants who could specifically provide appropriate and relevant information regarding credit risk management in agricultural lending. The credit officers and managers selected were people who worked in the credit risk and agricultural finance units of the banks. As a result of the nature of their jobs, they had relevant knowledge and could provide adequate information on credit risk management in agricultural lending. Further, the approach was not only cost-effective but was also time-effective in practice. The population size was 1,800 for the questionnaire data and 12 for the interview data collection. Sections 4.3.1 and 4.3.2 discuss the selection of participants for the questionnaire and interview data respectively.

4.3.1 Selection of Participants for the Questionnaire

This section describes the selection of participants for the questionnaire. The size of the study population in the selected four commercial banks was 1,800, an average of 450 participants from each commercial bank for the questionnaire data. Cochran's formula and Cohen's table could have been equally used to estimate appropriate sample size in this study but the decision was the Krejcie and Morgan formula that is widely used, easy to understand, and easy to apply as compared to the others (Chuan, 2006; Ofori-Nyarko, 2017). Krejcie and Morgan (1970) provide a table to guide in the selection of sample size. By using the table, a sample size of 336 participants was found to be representative of the study population size of 1,800 for the questionnaire data. However, 319 participants turned up representing a response rate of 94.9 percent. With the above sample size, an average of 79 participants from each bank was purposively selected across Ghana. An in-depth interview was also used to collect data for the qualitative analysis. The next section 4.3.2 highlights how the participants were selected for the interview.

4.3.2 Selection of Participants for the In-depth Interview

This section describes the selection of participants for the interview data collection. The size of the study population in the selected four commercial banks was 12 participants for the in-depth interview representing an average of 3 participants from each bank. This comprised twelve (12) managers and credit officers, 3 each from the Head Offices of Prudential Bank Ltd, GCB Bank Ltd, ADB Bank Ltd, and Stanbic Bank Ghana Ltd in Accra. The purposive sampling technique described in section 4.3 was used to select participants for the in-depth interview due to the information they possess relating to their roles regarding credit risk management and agricultural lending. Purposive sampling was used because the managers and credit officers were major players in taking major decisions on risk management practices in agricultural finance and therefore provided more relevant information (Campbell et. al, 2020). The Head Offices were purposively targeted for the interview because they oversee the implementation of risk management policies in all other branches and best provided reliable and accurate data. However, ten (10) participated indicating a response rate of 83 percent. A maximum of 3 staff was targeted then from each bank since the researcher reached saturation after interviewing 2 to 3 participants. The staff for the interview results supplement the information that was gathered through the questionnaire and policy documents.

4.4 Data Sources

The data was gathered from the bank of Ghana and Commercial Banks through questionnaires, policy documents, and in-depth interviews. Specifically, the study obtained data from primary and secondary sources. From the primary source, data were obtained using self-administered questionnaires and in-depth interviews while the Central bank of Ghana constitutes the main source of secondary data as derived from its policy documents. Each of these sources is subsequently discussed.

4.4.1 Primary Sources of Data

The primary source of data was the staff of the four Ghanaian Commercial Banks (GCB Ltd, PBL, ADB Ltd, and SBG) using questionnaires and in-depth interviews to evaluate the three objectives. The questionnaire was a closed-ended statement of questions with answers for participants to provide a tick against each statement. The questions were directed to participants to minimize bias. An interview was also conducted with the risk managers and senior credit

officers regarding the effectiveness of the implementation of credit risk management policies and credit risk mitigation strategies specified in objectives two and three respectively. The primary data yielded relevant and reliable data from the sample population without compromising quality. The self-administered questions as a form of primary data collection are described in section 4.4.1.1.

4.4.1.1 Self-Administered Questionnaire

The questionnaires were made up of closed-ended lists of questions in the form of a Likert scale with possible answers (*Never, Seldom, Sometimes, Very Often, and Always*) distributed to participants from GCB, PBL, ADB, and SBG. The questionnaires were adapted from Afande (2014) and modified to suit the Ghanaian context. The questions selected and modified covered the scope and achieved the objectives of this study. The questions were structured in four parts. Part A provided the demographic information of the participants; part B focused on credit risk identification methods with 17 questions; part C consisted of 15 questions on the effectiveness of the implementation of credit risk management policies and the last part D contained 17 questions on the effectiveness of credit risk mitigation strategies in agricultural lending. All the questions were closed-ended. The closed-ended questions help limit the bias of participants that usually emerges from open-ended questions. The online data collection was used following the impact of the Covid-19 (Corona Virus) pandemic that created fear and panic, and national guidelines on social distancing as part of Ghana's strategy in reducing the spread of the virus as directed by the Ghana Ministry of Health (MoH, 2020). Four research assistants were recruited to collect data and monitor this through the questionnaire under the direct supervision of the researcher to ensure that all the geographical areas were covered. The research assistants ensured that the data collected were representative of the four commercial banks, free from error, duplication, and bias. As a result, the research assistants made daily calls and follow-ups on credit officers and managers of the four selected commercial banks to ensure that the questionnaire instruments were adequately completed. The research assistants also ensured a convenient coverage of the geographical area. In this context, the geographical area was divided into four zones namely the Northern, Southern, Eastern, and Western zones, where each research assistant was assigned to one of the zones. Lastly, because the quantitative and qualitative data were sourced at the same time, the recruitment of the research assistants was significant to the extent that they complemented efforts to reduce the time significantly, and

therefore allowed for more time for the researcher to obtain the qualitative data through in-depth interviews and reviewing policy documents from the Central Bank of Ghana. All questions were checked by well-seasoned professionals and were crafted to facilitate sorting (Lazarova, Cerdin, & Liao, 2014). The seasoned professionals consisted of Professors, doctorate holders, and Young Scholars in Finance. They were intellectuals with the experience, knowledge, skills and ability to provide reasonable advice on the subject matter of this study (Taherdoost, 2016). The questionnaire was validated for content validity using Cronbach's Alpha test described in section 4.4.1.2.

4.4.1.2 Data Quality Control, Validity, Reliability Credibility, Consistency

Questionnaires were checked as soon as they were completed to ensure quality. Quality control of data was maintained by focusing on reliability, validity, consistency, and credibility. The study uses content validity to engage independent assessors in evaluating the characteristics and content of the study. There was a cross-examination, proofreading, and experts' involvement to avoid material errors and misstatements to authenticate the correctness of the data. The data gathered was managed to ensure credibility and consistency to reduce bias as explained in this section. Content validity¹⁴ was employed to validate the questions. Also, to test for consistency of responses against the questionnaire designed for these variables, Cronbach's Alpha test was used in equation 1. This is the most widely used approach which assumes that each indicator variable contributes equally to the factors and is easy to construct, interpret and compute as compared to the omega test, beta, and lambda coefficients, which are difficult to construct and understand (Guio, Gordon, Marlier, Najera, & Pomati, 2017; Unterrainer, Rahm, Kaller, & Wild, 2019). The Cronbach's Alpha test formula is:

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

Where:

N = the number of items.

C= the average covariance between pairs of items.

¹⁴ Content validity has been described as the degree to which items in an instrument reflect the content universe to which the instrument will be generalised (Taherdoost, 2016).

V = the average variance

The coefficient of 0.70 and above is considered reliable.

Therefore, the researcher repeated the findings with all the participants in the same context to eliminate bias. The study ensures that results represent the evidence gathered from participants' data and reflect the actual understanding of the participants' unique opinions. Cronbach's Alpha coefficient exceeds ($\geq .70$) implying data are considered reliable. Also, the Kaiser-Meyer-Olkin (KMO) sampling adequacy test and Bartlett's test of sphericity were used to assess the suitability of the data for analysis. The results of the KMO test and Cronbach's Alpha coefficients are presented along with the results of the analysis in Chapters 6 and 7.

4.4.1.4 In-Depth Interview

An in-depth interview was used for gathering analytical information to support and also validate the findings obtained from the questionnaires. The in-depth interview guide was specifically generated for the staff of the Commercial banks who are directly involved in agricultural finance and risk management. The interviews were conducted through telephone conversations thereby reducing face-to-face interaction in line with national guidelines in light of the Covid-19 pandemic (MoH, 2020). The interview questions contained open-ended questions as indicated in Appendix 1. The interview questions were constructed based on existing literature (Afande, 2014) and the objectives of the study to augment the results obtained from the closed-ended questionnaire. An interview guide was generated and used in the in-depth interview for gathering data. The researcher recorded all interviews and transcribed the information. The in-depth interviews provided detailed information compared to other means of data collection methods (Creswell et al., 2017). Information gathered through the interview was highly confidential. Section 4.4.1.3 describes ethical considerations and confidentiality regarding this study.

4.4.1.3 Ethical Considerations and Confidentiality

In this study, informed consent, anonymity, privacy, and confidentiality were the ethical issues that were addressed. The study sought ethical clearance from the University of KwaZulu-Natal in South Africa through the Social Science Research Ethics Committee of the University and this was granted (Refer to Appendix 2). The permission to conduct the study was sought from ADB Bank Ltd (ADB), Prudential Bank Ltd (PBL), GCB Bank Ltd (GCB), and Stanbic Bank Ghana Ltd (SBG) which was approved. Written informed consent letters were obtained from ADB Bank Ltd,

Prudential Bank Ltd, GCB Bank Ltd, and Stanbic Bank Ghana Ltd as indicated in Appendices 3, 4, 5, and 6). The researcher maintains anonymity by substituting participants with coded names and restricting recognizing data within oral presentations, this dissertation, and consequent materials from journal publications. Before conducting the study, information relating to the research, investigation processes, risks associated with this study, and the investigator's trustworthiness (Creswell et al., 2017) were fully disclosed to the participants. The commercial banks had the chance to pull out from the study at any time of their choice. Having granted permission, the researcher approached the participants in each Bank and sought their voluntary involvement in the study. Data obtained is stored with the University of KwaZulu-Natal for 5 years as required by the ethics standards.

4.4.2 Secondary Sources of Data

The secondary data were gathered from policy documents of the Central Bank of Ghana to provide additional information to support data that was gathered through interviews and questionnaires. The documents include policies and regulations on Credit Agreements, Credit Guarantee, Training, and Professional competence, Reporting, Examination, and Investigation Requirements, Knowing Your Customers, Minimum Capital Requirement, and Risk Monitoring, and Review requirements policies. This allows the researcher to make a comparison of significant relationships among variables to draw a valid conclusion. The documents analysed were publically available at the Bank of Ghana website at the time of this study and there were no conditions attached on the use of this information in the public domain. The review was conducted within a month. Simply put, the technique helped the researcher to select documents that have a direct relationship with credit risk management and the implication on agricultural lending.

4.5 Data Analysis

As shown in Table 5.0, the study used qualitative and quantitative data analysis approaches to determine the variables and how these variables were measured and analysed. The approaches helped to achieve the three objectives namely; credit risk identification methods, the effectiveness of the implementation of credit risk management policies, and the effectiveness of credit risk mitigation strategies used to minimise credit risk exposure of commercial banks. Questionnaire and interview data collection techniques as well as policy document review were

used. Principal components analysis (PCA), thematic analysis, and document review were the main models employed.

Table 5.0 Methodology Summary

Research Objectives	Data collection tools	Methodology
<i>Credit risk identification methods in agricultural finance</i>	Questionnaires	Exploratory Analysis (Principal Component Analysis).
<i>Effectiveness of the Implementation of credit risks management policies in agricultural finance</i>	Questionnaires	Exploratory Analysis (Principal Component Analysis)
	In-depth interviews	Thematic Analysis.
	Policy documents from the Bank of Ghana	Document Analysis
<i>Effectiveness of credit risk mitigation strategies in agricultural finance</i>	Questionnaire	Exploratory Analysis (Principal Component Analysis)
	In-depth interviews	Thematic Analysis.

Source: Author’s compilation (2021)

Table 5.0 shows the three objectives with the corresponding data collection tools and analytical or estimation techniques. A full discussion of the estimation technique is done in section 4.5. After collecting the data from primary and secondary sources, all necessary analyses (qualitative and quantitative) thereof were carried out using the Statistical Package for Social Science version 25 (SPSS 25) software, Microsoft Excel office, and Nvivo. While the collated data were further assessed using applicable statistical tools, this succinctly aided the evaluation of the effects of credit risk management practices on agricultural finance on the Ghanaian Commercial Banks. Herein descriptive analysis and inferential methods were deemed necessary to address the research objectives for this study. The descriptive analysis was used in line with socio-demographical variables for certain objectives. The quantitative and qualitative methodical approach was conducted using each objective as follows:

4.5.1 Credit Risk Identification Methodology

To achieve the first objective of identifying the credit risk deification methods in agricultural lending, the Exploratory and Confirmatory Factor Analysis (EFA, CFA) can be applied. However, the Principal Component Analysis (PCA) of the exploratory factor analysis model is more appropriate to explore the Ghanaian Commercial Banks model of credit risk management practices in agricultural finance. The PCA is very simple, reduces redundancy (variables that are

correlated and measuring the same construct), and does not yield an improper solution (Hatcher & O'Rourke, 2013). Also, no latent variables are assumed since the participant's scores on the components can be calculated directly and the result interpreted just like the EFA. Yoshino and Taghizadeh-Hesary (2018) and Wubin et al. (2020) achieved similar objectives using this model.

The PCA was used to determine the factors and methods in the identification of credit risk in agricultural finance. These include portfolio view, audit reports, and other methods which have been reviewed in section 3.2 in Chapter Three. The modeling also helps examine the strength of the relationship between these common factors and observed measures. This study used the PCA for the reduction of the original variables into a lower number of orthogonal (non-correlated) variables for visualising the relationship between factors and the original variables and for visualising proximity in mathematical units.

The following steps are used:

- Initial extraction of components. The initial parameters of the problem are set. At the initial stage, the total number of extracted components is equal to the variables analysed, the 17 questions indicated in Part B of the questionnaire in Appendix 1. As the sequential factor selection continues the factors comprise less variability where the next stage is limited in terms of the factors.
- Determining the number of meaningful components that were retained: In determining the meaningful components (Norman, & Larry, 2014), the following procedures are carried out:
 - **Eigenvalue-one criteria** (components with eigenvalues >1 are retained and interpreted). Eigenvalues are the variances captured by a given component (Norman & Larry, 2014).
 - **The scree test**¹⁵ (eigenvalues for each component are plotted and identify breaks between large and small eigenvalues). Components that appear before the break were assumed to be more meaningful than those that appear after the break (Johnstone & Lu, 2009; Linting & van der Kooij, 2012)

¹⁵ Scree test is a line plot of eigenvalues of factors or principal components in an analysis of multivariate statistics and used to determine the number of relevant components or factors in a principal component analysis or factor analysis (Ledesma, Valero-Mora, & Macbeth, 2015).

- **The proportion of variance accounted for** = eigenvalue of a given component / total variance of the correlation matrix. The study retains all components that have accounted for more than 5 percent of the total variance.
 - **Interpretability criterion:** interpreting the substantive meaning looking at variables with significant loadings, variables that load on specific components, and whether they share similar conceptual meaning, variables that load on different components measuring different constructs.
- **Rotating to a final solution:** interpretation of rotated solution, and creation of factor scores. There are different types of rotations identified by Dien (2010), Mabel and Olayemi (2020), Michael (2020) namely Varimax rotation, Promax rotation, Oblimin rotation, Quartimax, and Equamax among others. The Varimax rotation is an orthogonal rotation that assumes that the factors are independent (Mabel & Olayemi, 2020). Promax rotation takes the form of the Varimax solution as an initial point and then reduces the orthogonality constraints by undertaking an additional rotation in which the orthogonality is no longer required (Dien, 2010). Oblimin rotation is a rotation that provides an oblique solution that allows the factors to be correlated. Quartimax rotation is a rotation that minimizes the number of factors needed to explain each variable (Michael, 2020). Equamax rotation maximises a weighted sum of the varimax and Quartimax criteria reflecting a concern for simple structure within variables and factors (Michael, 2020). The Varimax rotation method was used in this study. The Varimax rotation method is used because it is common and widely used (Mabel & Olayemi, 2020); maximises the variances of the factor loadings, and allows factors to remain independent of each other (Konovalova et al., 2016). This implies that the values of the variables of one factor do not correlate with the values of other factors.
- **Assessment of the adequacy of the solutions achieved:** A correlation matrix was built for the verification of the validity of the relevant factors. The reproduced correlation coefficient has to turn close to the original matrix, to validate the relevant factors (Norman & Larry, 2014). A residual correlation matrix needs to be built, of which the elements are equal to the differences between the original elements and the matrices reproduced to examine the extent of possible deviations of the elements of this matrix from the original one (Konovalova et al., 2016). Highly correlated items were retained.

4.5.1.1 PCA Formula Procedure

The vectors of the p-dimensional feature were summarised into a q-dimensional subspace. The reduction, therefore, involves projecting the original vectors onto a direction, thus the principal component (PC) which influences the credit management practices of commercial banks in agricultural finance. The study makes use of the minimising projection residual and maximising variance approach to examine the PCs of commercial banks' model of credit risk management practices. Hence the first principal component represents the direction in the feature space in which the prognoses have the highest variance. Also, the second component represents the direction that maximises the variance from all the directions orthogonal to the first.

Hence, the K^{th} component = $K - 1$ component. It means that the K^{th} factor represents the variance-maximizing direction orthogonal to the preceding $K - 1$ component. For instance, if the data for this study has been centered so that all features have a mean = 0; the data is expressed as Matrix X as:

$$x^x = nV \tag{2}$$

Where V represents the covariance matrix of the data. Following, the score for each respondent of a particular component was computed. It means that participants were scored for each component. For instance, with the 4 components identified, each respondent had 4 scores with one score representing each of the components. For this objective, the researcher weighed the participants' actual scores on the 17 questionnaire items in Appendix 1 and sum them up for the estimation of scores for the given components. This was expressed as follows;

$$M_1 = W_1(X_1) + W_2(X_2) + W_3(X_3) + \dots + W_{1P}(X_P) \tag{3}$$

Where:

M_1 = score of participants on Principal components (1st component extracted)

W_1 = the coefficient (weight) of observed variables

X_p = score of the respondent on the observed variable

Therefore, if factor 1 in this study is 'audit checks' the researcher estimates the scores on each participant by using the data and formula below:

$$M_1 = W_1(X_1) + W_2(X_2) + W_3(X_3) + W_4(X_4) + \dots + W_{17}(X_{17}) \quad 4$$

In the above, the X variables; the observed variables refer to the participant's responses to the 17 questions on credit risk identification methods stated in Part B of the questionnaire in Appendix 1.

Where:

X_1 = question 1; X_2 = question 2; X_3 = question 3; X_4 = question 4 and so on.

Hence, subsequent components were separately measured by different constructs depending on the components extracted. The estimation of scores of the subsequent components was done using different equations with different coefficients. By this estimation technique, meaningful components were retained indicating the most frequently used methods forming part of the components used by commercial banks to identify credit risk and minimize credit risk exposure in agricultural finance.

4.5.1.2 Assumptions in Principal Component Analysis

The methods used to extract factors and components in this study do not make strong distributional assumptions; normality is essential only to the extent that skewness affects the observed correlations when significant tests are carried out (which is rare for PCA and EFA) (Pozo, Arruga, Mujica, Ruiz, & Podivilova, 2016). The skewness value of each variable can be computed to check the normality of the distributions. The maximum likelihood estimation requires multivariate normality. Independent sampling was done since principal axis factor analysis and principal component analysis was based on correlations.

4.5.2 Effectiveness of the Implementation of Credit Risk Management Policies

To assess the effectiveness of the implementation of credit risk management policies of commercial banks in agricultural finance, the study adopts three main approaches namely Exploratory Analysis of the PCA model, Thematic Analysis of the interview, and Document Analysis. Each of these models is discussed in the subsequent section.

4.5.2.1 EFA Model on the Effectiveness of Credit Risk Management Policy Implementation

For objective two, the exploratory analysis of the PCA was adopted to ascertain the effectiveness of the Ghanaian Commercial Banks methods of the implementation of credit risk management policies in agricultural finance. Using an exploratory factor analysis for this study enables the researcher to measure the number of common factors (variables) influencing a set of measures in the commercial banks' model of credit risk policy implementation in agricultural finance (such as loan appraisal process, authorization procedures, loan approval processes, credit limit review and other policies, discussed in section 3.3 of chapter 3, and to estimate the significance of the correlation between each variable and each observed measure. This provides an opportunity for the researcher to identify the nature of the constructs underpinning responses within commercial banks' credit risk management practices on agricultural finance. The study adopted the abstraction technique of PCA to classify the factors' impacts on the Ghanaian Commercial Banks model of credit risk management policy implementations in agricultural lending. This approach is a mechanical statistical model that takes into consideration the influences through which changes occur (Alavi et al., 2020). Thus, as an exploratory method, the PCA was used to control the variables into lower numbers of orthogonal harmonized factors, present the graphical relationship between the factors and variables and visualize proximities among the measuring units. The procedures described in section 4.5.1 were used to extract meaningful components.

4.5.2.2 PCA Formula Procedure

The formula procedures described in section 4.5.1.1 were used to analyse this objective. The aim of using PCA in this study was to synthesize p -dimensional variables into a q -dimensional category. Hence, for this study, the reduction process requires the trajectory estimation of the original variables on to q directions – the key factors that impact the Ghanaian Commercial Banks model of credit risk management practices on agricultural finance. Therefore, each respondent would have scores for each given factor. Thus, each respondent's actual scores on the fifteen (15) questions indicated Part C of the questionnaire items in Appendix 1 on the effectiveness of the implementation of credit risk management policies were weighted and then summed up to measure their scores for a given factor. The scores of the estimation procedure extract relevant components representing the most frequently used credit risk implementation factors adopted by commercial banks to manage credit risk in agricultural finance. These scores

provided the basis for assessing objective two which is the effectiveness of the implementation of credit risk management policies of commercial banks in agricultural finance.

4.5.2.3 Analysis of Policy Documents from the Bank of Ghana

Despite the use of the questionnaire, there was a need for secondary confirmation to help assess the effectiveness of credit risk management policies in commercial banks. Therefore, the study used data on policy documents from the Banking Sector Supervision Department of the Central Bank of Ghana. Glenn (2009) describes document analysis as a systematic procedure used to review, examine, and evaluate printed or electronic¹⁶ documents. In this study, documents are reviewed, examined, evaluated, and interpreted to provide meaning, understanding, and develop empirical knowledge (Corbin, & Strauss, 2008; Glenn, 2009). The analysis of documents provided background information on the implementation of credit risk management policies in commercial banks. This information enabled the researcher to contextualise the data gathered through in-depth interviews. The analysis process in this study involved skimming and thoroughly reading through the policy documents before the results were interpreted. The process used content and thematic analysis elements. Information from the policy documents regarding credit risk management was classified where meaningful and important facts were identified. The categories for analysis were the themes that emerged from the patterns recognised within the data (Fereday & Muir-Cochrane, 2006). To uncover the themes, the study concentrated on the data selected and constructed categories and coded objectively and sensitively based on data characteristics (Glenn, 2009). The researcher undertook a content analysis of documents exploring key areas involving policies and regulations on Credit Agreements, Credit Guarantee, Training, and Professional competence, Reporting, Examination, and Investigation Requirements, Knowing Your Customers, Minimum Capital Requirement, and Risk Monitoring Review requirements, and any other available document from the Bank of Ghana which the researcher deemed important. This enabled the researcher to analyse regulatory documents and made a comparison to the credit risk management practices of Ghanaian commercial banks. The information gathered from the policy documents also informed some relevant questions that needed to be probed and areas that need to be observed during the interview. This provided a way of tracking differences in information, risk management

¹⁶Electronic documents represent both computer-based and internet-transmitted materials of an entity (Glenn, 2009).

implementation strategies in commercial banks, and development over time. The analysis of policy documents provided a means of verifying the findings and corroborated the results from the interview and questionnaire. The content analysis of documents helped in identifying characteristics of policy content, enabled the researcher to make inferences to risk management practices used by commercial banks, the effectiveness of monitoring and supervisory roles played by BoG on implementation of credit risk management policies in commercial banks, and to predict effects of credit risk management policy documents used by the BoG in helping the commercial banks mitigating credit risk.

4.5.2.4 Thematic Analysis of Interviews; Credit Risk Management Policy Implementation

To support the document and quantitative analysis, the researcher also conducted an in-depth interview on the banking sector supervision of the bank of Ghana to explore implementation processes and procedures of credit risk policies. The researcher used in-depth interviews to probe and respond to user data as it emerges. Three (3) staff were identified since the researcher reached saturation after interviewing 2 to 3 officials. In line with Braun and Clarke (2018) and Braun and Clarke (2006), thematic analysis was employed to enable the researcher to categorise and present the themes that were developed from the evidence collected; transcribe the interview results; read through the interview responses, and look for patterns or themes among the responses of the participants; familiarise with data gathered; assign preliminary codes to data to describe the content and search for patterns of themes; review the themes, define main themes, and present key findings. In line with Corbin and Strauss (2008), this study summarises the findings under five themes and describes each theme in a narrative style, and relates the findings to the data gathered. The NVivo software was employed to transcribe the qualitative data. This software groups various answers into themes and helps in the organization, storing and retrieving data proficiently (Azeem, Salfi, & Dogar, 2012; Bazeley & Jackson, 2013). The researcher used this application to save time and rigorously backing up results with solid evidence whilst focusing on means of investigating the significance of recorded data.

4.5.3 Methods of Analysing the Effectiveness of Credit Risk Mitigation Strategies

The third objective was the assessment of the effectiveness of credit risk mitigation strategies adopted by commercial banks in agricultural finance was achieved using two models. First is the

PCA model through the use of questionnaires. Second, thematic analysis was carried out using results obtained through in-depth interviews on the participants from the selected four commercial banks. The two models were used to synergize with each other to achieve the full rigor of the objective. Each of these models is discussed in the subsequent sections 4.5.3.2 and 4.5.3.3.

4.5.3.1 PCA Modelling of the effectiveness of Credit Risk Mitigation Strategies

The PCA was used as one of the models to evaluate the third objective. The PCA model has been described in detail in section 4.5.1 of this chapter. Again the P-dimensional feature vectors are summarized into a q-dimensional subspace and original vectors projected onto a direction, representing the key principal components that influence the strategies used by commercial banks to mitigate credit risk in agricultural lending. The minimization of projection residual and maximizing variance approach was adopted. The first principal component represents the direction in the feature space which the highest variance whilst the second component represents the direction that maximises the variance from all the directions orthogonal to the first. The K^{th} component = $K - 1$ component, means that the K^{th} factor represents the variance-maximizing direction orthogonal to the preceding $K - 1$ component as earlier discussed in section 4.5.1. The procedures for using the PCA to extract the relevant components have been discussed previously in sections 4.5.1 and 4.5.1.1.

The PCA approach weighed the participants' actual scores on the generated 17 questions indicated in Appendix 1 and added up to estimate the scores of the various components. It is mathematically expressed;

$$S_1 = W_1(X_1) + W_2(X_2) + W_3(X_3) + \dots + W_{1P}(X_P) \quad 7$$

Where:

S_1 = participants score on 1st Principal components extracted

W_1 = the coefficient (weight) of observed variables

S_p = score of the respondent on the observed variable

Therefore, if factor 1 in this study is 'loan review and documentation', the researcher calculated the scores on each Principal component of each participant by using the fictitious data in the formula below:

$$S_1 = B_1(X_1) + B_2(X_2) + B_3(X_3) + B_4(X_4) + \dots + B_{17}(X_{17}) \quad 8$$

The X variables represent the participant's responses to the 17 questions on risk credit risk mitigation strategies.

Where:

B_1 = the coefficient (weight) of observed variables; the X_1 = question 1; X_2 = question 2; X_3 = question 3; X_4 = question 4. Subsequent components were estimated by using different equations with different coefficients.

4.5.3.2 Thematic Analysis of Interviews on Credit Risk Mitigation Strategies

To probe more into strategies used in mitigating risks by Ghanaian Commercial Banks, an in-depth interview was conducted for 10 participants purposively selected from the head offices (Credit and Agricultural Finance Departments) of Prudential Bank Ltd, ADB Bank Ltd, GCB Bank Ltd, and Stanbic Bank Ghana Ltd to validate and complement the findings that were obtained through the questionnaire. The sample selected was more representative as the researcher reached a level of saturation after interviewing 2 to 3 participants from the various banks. The head offices were targeted because, they designed the strategies, supervise all the other branches, and could best provide relevant information on the subject area.

The Nvivo software was used to analyse the data to generate teams as they were unveiled for discussion. The theme generation and analysis went through the steps below:

- Five themes were developed, categorised, and presented from the evidence gathered and analysed in section 6.5 in chapter 6.
- The results of the interview were transcribed for easy understanding.
- Interview responses were thoroughly read through to identify patterns among participants' responses.

- The researcher familiarised himself with the data gathered by the use of thematic analysis.
- The researcher assigned preliminary codes to data gathered to effectively describe the content of participants' responses and patterns of themes were identified.
- Themes were reviewed, defined and key findings were presented and discussed in Chapter seven.

4.5.4 Additional Test

Even though the thematic and the PCA analysis are sufficient to achieve objectives one two and three, an additional test; the Analysis of Variance (ANOVA) and Multivariate Analysis of Variance (MANOVA) tests was explored. The reason for using these tests is to assess whether or not significant differences exist in the credit risk management practices among Ghanaian commercial banks in their agricultural finance which includes credit risk identification methods, credit risk policy implementation, and credit risk mitigation strategies, and to compare multivariate sample means.

4.5.4.1 The ANOVA and the MANOVA Tests

Using the ANOVA and MANOVA, this study statistically tested whether a significant difference is present among the three commercial banks mean cores on (1) their credit risk management methods and their applications to mitigate risks in agricultural finance; (2), their implementation of credit risk management policies in agricultural finance; and (3), the strategies they used to mitigate credit risks in agricultural finance. Therefore, the t-test in ANOVA is the ratio of the between and within variation in the data being used, which follows an F-distribution (Kim, 2014). In other words, it is mathematically expressed as

Total Sum of Squares (TSS) less the total variation in the user data (that is, the sum of the between and within variation). Using **objective 1** as an example, the Sum of Squares (or credit risk management methods Sum of Squares) minus variation in the data between the different samples. This is mathematically expressed as:

$$TSS = \sum_{i=1}^r \sum_{j=1}^c (X_{ij} - \bar{X})^2$$

9

Where r = the number of rows in the table; c = the number of columns in the table; \bar{X} = the grand mean; X_{ij} = the j^{th} observation in the i^{th} column. The level of significance is fixed at 5 percent since a p-value of 5% is considered statistically significant indicated by Jackson (2009) and Rouder, Morey, Speckman, & Province (2012). If the ANOVA test showed significant differences between banks in their credit risk management practices, it means that some of the credit risk management practices adopted by commercial banks to manage credit risk associated with agricultural lending are bank-specific.

4.6 Chapter Summary

The study presents qualitative and quantitative analysis of the effects of credit risk management practices of commercial banks in agricultural finance. The study analyses the credit risk management practices of three commercial banks in Ghana. The selected banks include GCB Bank Ltd, Prudential Bank Ltd, ADB Bank Ltd, and Stanbic Bank Ghana Ltd. These institutions were selected because they were the only banks that consented to research of this nature at a time when the Covid-19 pandemic struck in Ghana. Also, these banks are actively involved in agricultural finance in Ghana. the same banks are widely distributed over Ghana and findings from this study could be generalised. The chapter explains the sources of data and how the data was evaluated. The questionnaire, in-depth interviews, and policy documents from the Bank of Ghana represent the main sources of data collection.

To determine credit risk identification methods in commercial banks the PCA was used to reduce the variables into components. Again, the PCA of the exploratory factor analysis model, thematic analysis, and content analysis was used to analyse the effectiveness of credit risk policy implementation in commercial banks in agricultural lending. Two sets of interview guides were targeted at the credit officers of the selected banks and the banking sector supervision unit of the Bank of Ghana. In addition to PCA, thematic analysis was adopted to examine the strategies used by -commercial banks to mitigate credit risk exposure in lending to agriculture. The following chapter discusses the analysis and interpretation of data collected through the questionnaire regarding credit risk management practices of commercial banks in agricultural lending.

CHAPTER 5

ANALYSIS OF CREDIT RISK IDENTIFICATION METHODS, POLICY IMPLEMENTATION, AND MITIGATION STRATEGIES

5.1 Introduction

Three main methods namely the PCA, thematic, and document analysis were used to supplement each other in the consolidated analysis of data. First, the questionnaire data were analysed using the PCA. The interview and policy document scrutiny was conducted using thematic and document analysis respectively to complement the questionnaire results. The results are presented on the basis of the study objectives where questionnaires, interviews, and policy documents were analysed to assess the methods used by commercial banks to identify credit risks in agricultural finance; the effectiveness of the implementation of credit risk management policies and the effectiveness of credit risk mitigation strategies used by commercial banks to manage credit risk associated with agricultural lending. The chapter is structured in seven sections. The first section 5.1 provides a background introduction to the chapter. The second section 5.2 reports on the demographic characteristics of participants. The third section 5.3 presents the descriptive statistics and results of the findings according to the objectives of the study. The fourth section 5.4 discusses the difference between Commercial Banks. The fifth section 5.5 discusses the qualitative data analysis whilst the last section briefly summarises the findings of this chapter. The sixth section 5.6 offers an analysis of policy documents from BoG and the last section 5.7 is a synopsis of the chapter.

5.2 Demographic Characteristics of the Participants

The demographic information provided data on the participants necessary for the determination of whether or not the participants were a representative sample of the target population of the Ghanaian commercial banks for generalisation of the findings from the questionnaire and interview. The completed questionnaires were received from the participants of the four commercial banks namely GCB, ADB, SBG, and PBL. Out of 336 questionnaires circulated, 319 were completed, representing a response rate of 94.9 percent ($n = 319$) of the target population for the quantitative data collection. Also, out of the total 12 participants who were targeted for the interview, 10 participants turned up making a response rate of 83 percent.

For the 319 completed questionnaires, gender was categorised into a male, female, and prefer not to answer. Most of the participants (62.1%, n = 198) were males whilst 37.9 percent (n = 121) were females. Thus, the credit management staff of commercial Banks in Ghana is male-dominated. Blanco-Oliver, Reguera-Alvarado, and Veronesi (2021) observed that a higher proportion of female loan officers increase the loan portfolio at risk. Besides, in a study of this sort where knowledge, skills, experience, policies, and level of education are required, gender does not have a significant impact (Belás, Mišanková, Schönfeld, & Gavurová, 2017). The study also investigated the work experience of the credit staff (participants). It emerged that from the sample, 14.7 percent, (n= 47) had 1-2 years of work experience, 30.4 percent (n=97) had 3-4 years of work experience, whilst the majority of the participants had 5 years and above work experience (54.9%, n = 175). This implies that the majority of the participants are significantly experienced and could therefore make meaningful contributions to the study. The study further considered the participants' academic qualifications, which was categorised into those with Senior High School / Diploma, Higher National Diploma (HND) holders, Degree (First degree), Master's degree holders, and Doctoral degree holders. The majority of the respondents have a first degree which constitutes 44.5 percent (n = 142) of the sample, followed by Master's degree holders constituting 23.8 percent (n = 76) of the sample. It implies that most of the participants are qualified for the execution of their chores. Studies have shown that people with higher education and theoretical knowledge of corporate capital have a significant influence on credit risk management (Belás et al., 2017). Also, the study investigated banks' response rates and participants were evenly distributed among the four selected commercial Banks in Ghana. BANK A recorded the highest response rate of 25.7 percent (n = 82) followed by Bank B Ghana Ltd with a response rate of 25.4 percent (n = 81). Bank C Ghana Ltd and Bank D Ltd recorded response rates of 24.8 percent (n = 79) and 24.1 percent (n = 77) respectively as indicated in Table 5.1.

Table 5.1: Demographic Characteristics of Participants

<i>Variables</i>	<i>Frequency(n)</i>	<i>Percentage (%)</i>
<i>Gender</i>		
<i>Male</i>	198	62.1
<i>Female</i>	121	37.9
<i>Participants' years of experience</i>		
<i>1 - 2 years</i>	47	14.7
<i>3 - 4 years</i>	97	30.4
<i>5 years and above</i>	175	54.9
<i>Participants' qualification</i>		
<i>SHS/Diploma</i>	34	10.7
<i>HND</i>	67	21.0
<i>Degree</i>	142	44.5
<i>Masters</i>	76	23.8
<i>Doctoral</i>	-	-
<i>Participants' Bank</i>		
<i>Bank A</i>	82	25.7
<i>Bank B</i>	81	25.4
<i>Bank C</i>	79	24.8
<i>Bank D</i>	77	24.1

Source: Author's estimates (2021)

5.3 Quantitative Analysis of Data on Credit Risk Identification Methods, Implementation of Credit Risk Management Policies and Credit Risk Mitigation Strategies

The results of the quantitative analysis are presented in this section. Each subsection of this section presents the results of principal components used to analyse the questions for each objective. A summary of the responses is presented in Tables 5.2, 5.7, and 5.12 respectively on credit risk identification methods, the effectiveness of the implementation of credit risk management policies, and the effectiveness of credit risk mitigation strategies of commercial banks in agricultural lending.

5.3.1 Results of Credit Risk Identification Methods

The first research objective was designed to examine the methods used by commercial banks to identify credit risks in agricultural finance. This objective identified the methods that commercial banks use to identify credit risk exposure in agricultural lending. To achieve this objective, a list of 17 questions on credit risk identification methods was generated to indicate how often or not these methods are used to identify credit risks in agricultural finance. A Likert-type scale was used as a measurement indicator for all questions where Never = 1, Seldom = 2, Sometimes = 3, Very often = 4 and Always = 5. Cronbach's Alpha coefficient in Table 5.6 on the average exceeds ($\geq .70$) and this suggests adequate reliability. Table 5.2 shows a summary of the responses from participants on the methods used by commercial banks to identify credit risk in agricultural finance.

Participants were asked whether the sensitivity analysis method is used to identify credit risk. Results indicated that 7.5 percent ($n = 24$) of the participants never used the sensitivity analysis method to identify credit risk, 38.9 percent ($n = 124$) seldom used sensitivity analysis to identify credit risk, sometimes (26%, $n = 83$) and very often (21.3%, $n = 68$). It was also indicated that 6.3 percent ($n = 20$) always use the sensitivity method to identify credit risk exposure in agricultural finance. This implies that the majority of the participants at 38.39 percent ($n = 124$) in Ghanaian commercial banks seldom use the sensitivity analysis methods to identify credit risk in agricultural finance.

Also, participants were asked to indicate how often the credit portfolio view method is used to identify credit risk in agricultural finance. It was found from the data gathered that 4.4 ($n = 14$) indicated never, 15 percent ($n = 48$) responded seldom, 18.8 percent ($n = 60$) sometimes use the portfolio view method, 21.6 percent ($n = 69$) of the participants indicated very often and 40.1 percent ($n = 128$) always use the portfolio view method to identify credit risk in agricultural lending. The results indicate that the majority of the participants constituting 25 percent ($n = 128$) of the responses always use the credit portfolio view method to identify credit risk in agricultural finance. On the question of how often external audit checks are used to identify credit risk in agricultural lending, the findings are that 4.4 percent ($n = 14$) of the participants never used the portfolio view method to identify credit risk whilst 5.3 percent ($n = 17$) seldom use this method. In addition, 9.7 percent ($n = 31$) of the participants confirmed they sometimes used the external

audit checks method to identify credit risk exposure whilst 27.6 percent (n = 88) of participants very often used the audit checks method. Also, 55.5 percent (n = 177) of participants always use external audit checks as a method to identify credit risk in agricultural finance. The ultimate implication is that the majority of the participants 55 percent (n = 177) from the commercial banks always use external audit checks method to identify credit risk in finance agriculture.

To identify how often internal audit checks are used as a method for identifying credit risk, it emerged that, 1.9 percent (n = 6) of the participants never used it to identify credit risk whilst 4.7 percent (n = 15) seldom use it to identify credit risk in agricultural lending. There was evidence that 9.4 percent (n = 30) of participants sometimes use internal audit checks whilst 49.5 percent (n = 158) very often use this method. 34.5 percent (n = 110) always use this method to identify credit risk exposure. The results imply that the majority of the participants 49.5 percent (n = 158) in Ghanaian commercial banks very often use internal audit checks as a method to identify credit risk in agricultural finance.

To ascertain how often an objective-based approach is used to identify credit risk in agricultural finance, the results indicated that, 2.5 percent (n = 8) of the participants never used this approach whilst 6.0 percent (n = 19) participants seldom use the approach. It was also detected that 15.7 percent (n = 50) of the participants from the commercial banks sometimes use this approach to identify credit risk. Also, 55.5 percent (n = 177) indicated that they very often use the objective-based approach to identify credit risk in commercial banks. The findings also showed that 20.4 percent (n = 65) of the participants always use this approach to identify credit risk relating to agricultural funding. The results, therefore, suggest that most of the credit officers 55.5 percent (n = 177) in commercial banks most often use the objective-based approach to identify credit risk exposure of commercial banks.

Participants were further asked to indicate how often a scenario-based method was implemented. This was designed to establish how much the bank officials knew what could happen and the tasks involved to identify credit risk in agricultural finance in commercial banks. Results show that 6.6 percent (n = 21) never used this method whilst 10.3 percent (n = 33) participants seldom use the scenario-based method. It was also revealed that 22.9 percent (n = 73) of the participants sometimes use this method. The results also showed that 47.6 percent (n = 152) of the participants from the commercial banks very often used this method. Again, 12.5

percent (n = 40) always use this method to identify credit risk exposure of commercial banks. The results show that the majority of the participants 47.6 percent (n = 152) very often used the scenario-based method for identifying credit risk associated with agricultural finance in commercial banks.

Again, participants were asked to indicate how often credit report bureau reports are used to identify credit risk in commercial banks. The results portrayed that 11.3 percent (n = 36) of the participants never used credit bureau to identify credit risk whilst 49 percent (n = 158) testified that, the seldom-used credit bureau as a method for identification of credit risk in commercial banks. It was also indicated that 19.1 percent (n = 61) of the participants sometimes use this method whilst 14.7 percent (n = 47) very often used the credit bureau reports to identify credit risk. Further, 5.3 percent (n = 17) of the participants always use credit bureau reports to identify credit risk. In sum, the majority of the participants 49.5 percent (n = 158) seldom use the credit bureau method to identify credit risk.

In an attempt to ascertain how often tax returns for self-employed borrowers are used by commercial banks to identify credit risk in agricultural finance, results were that 38.9 percent (n = 124) never use this method whilst 15.5 percent (n = 59) seldom use tax returns as a method for identifying credit risk. It was also verified that 18.2 percent (n = 58) sometimes use the tax returns method for self-employed borrowers whilst 15.7 percent (n = 50) very often use this method to identify credit risk in agricultural finance. Also, 8.8 percent (n = 28) of participants indicated that commercial Banks always use the tax returns method to identify credit risk in agricultural finance. The analysis implies that the majority of participants (38.9%, n = 124) in commercial banks never use tax returns for self-employed borrowers as a method of identifying credit risk in agricultural finance. As part of the credit risk identification method, there was a question on how often a chart-based approach is used by commercial banks to identify credit risk in agricultural lending. It was noted from the results that 4.1 percent (n = 13) of participants in commercial banks never use the chart-based approach to identify credit risk whilst 20.1 percent (n = 64) participants seldom use this method. It was further revealed that 50.5 percent (n = 161) of the sample population sometimes use the chart-based approach whilst 18.8 percent (n = 60) very often use the method to identify credit risk. In the other dimensions, 8.8 percent (n = 28) of the participants in commercial banks indicated that they always use the chart-based

approach to identify credit risk in agricultural finance. The results show that the majority of the participants, 161 representing 50.5 percent of the sample, sometimes use the chart-based approach to identify credit risk in agricultural finance.

Regarding the extent to which the risk management review process is used by commercial banks to identify credit risk in agricultural finance, findings from the participants showed that only 1.3 percent (n = 4) of the participants indicated never whilst 4.1 percent (n = 13) of the sample population indicated seldom. It was also noted that 11.9 percent (n = 38) out of the 319 total participants in commercial banks sometimes use the risk management review process to identify credit risk in agricultural finance. Following, 13.7 percent (n = 98) of participants attested that, they very often use the credit risk management review method to identify credit risk in finance agriculture. The results also established that 52 percent (n = 166) always use the risk management review process to identify credit risk when finance agriculture. It can be concluded based on the results that most participants in commercial banks 52 percent (n = 166) always use the risk management review process as a method for identifying credit risk in agricultural finance.

Consultative views from third parties are one of the methods that were also assessed. Results show that 2.5 percent (n = 8) never use this method to identify credit risk in agricultural lending whilst 17.9 percent (n = 57) of the sample population seldom use this approach. It was further indicated that 46.1 percent (n = 147) of the participants from commercial banks sometimes use consultative views as a method of identifying credit risk in finance agriculture. Further, 21.3 percent (n = 68) of the participants from the commercial banks indicated that they very often use consultative views from third parties to identify credit risk whilst 12.2 percent (n = 39) attested that they always use this method to identify credit risk in agricultural finance. It implies that the majority (46.1%, 147) of credit officers in commercial banks sometimes use consultative views from third parties to identify credit risk in agricultural lending.

On the relevance of the independent agency review approach as a risk identification method, participants were asked to rate how often the independent agency review approach is used by commercial banks to identify credit risk in agricultural finance. Results from the participants indicated that 5 percent (n = 16) never use the independent agency approach as a method to identify credit risk in agricultural finance whilst 19.1 percent (n = 61) seldom use the method. In

furtherance, 50.2 percent (n = 160) of the participants indicated that they sometimes use the independent agency approach method whilst 17.6 percent (56) of the participants responded very often. Further, it was attested that 26 participants representing 8.2 percent of the sample population always use this approach to identify credit risk. This indicates that the majority of credit officers in commercial banks sometimes use the independent agency review approach to identify credit risk in agricultural finance. Participants from the commercial banks were also assessed on how often the loan syndication method is used to identify credit risk exposure of the banks. Results from that data gathered indicated that 45.5 percent (n = 145) of the participants from commercial banks use the loan syndication method such as collaborating with other lenders to grant loans to borrowers to identify credit risk in agricultural finance. Also, 25.7 percent (n = 82) of the participants seldom use this method whilst 10 percent (n = 32) of participants sometimes use the loan syndication method to identify credit risk in agricultural lending. It was also discovered that 11.3 percent (n = 36) of participants use the loan syndication method very often whilst 7.5 percent (n = 24) of participants always use this method to identify credit risk that is likely to be faced by commercial banks which advance loans to agri-businesses. The results from this analysis imply that the majority of the participants (71.2%, 227) from commercial banks cumulatively seldom and never embrace to use of the loan syndication method in identifying the credit risk exposure of banks in finance agriculture.

Regarding credit rationing methods such as actions taken to limit borrowers as a means of identifying credit risk in commercial banks, results indicated that 2.2 percent (n = 7) of the participants never use this approach whilst 4.7 percent (n = 15) participants seldom use this approach. It was also indicated that 9.1 percent (n = 29) of the sample population sometimes use credit rationing as a method of identifying credit risk of commercial banks whilst 22.3 percent (n = 71) very often use the method to identify credit risk. It was further identified that 61.8 percent (197) of the sample population always use the credit rationing method to identify credit risk exposure of commercial banks. This implies that most of the participants in commercial banks always use the credit rationing method to identify credit risk exposure of commercial banks in Ghana. Further, participants from the commercial banks were asked to rate how often a credit rating mechanism such as predicting the ability of a borrower to pay back loans is used to identify credit risk. Responses from the participants indicated that 0.9 percent (n = 3) of the sample population never use this method to identify credit risk in agricultural finance whilst 4.4 percent

(n = 14) participants seldom use the credit rating method to identify credit risk. Also, 9.7 percent (n = 31) of the participants sometimes use the credit rating method whilst 26.3 percent (n = 84) very often use this method to identify credit risk associated with agricultural finance. Additionally, 58.6 percent (n = 187) of participants in commercial banks always use the credit rating mechanism to identify credit risk resulting from agri-business finance. This shows that the majority of credit officers in commercial banks use the credit rating mechanism as a method to identify credit risk in agricultural lending. Also, participants from the commercial banks were asked to rate how often the Z-score model; a mathematical approach that identifies the possibility of credit risk, is used to identify credit risk in agri-business finance. Results from the responses indicated that 15.4 percent (n = 49) never use this method to identify credit risk whilst 46.7 percent (n = 149) of the participants seldom use the Z-score method. It was further detected that 25.1 percent (n = 80) of the participants sometimes use the Z-score method to identify credit risk associated with agricultural finance in commercial banks whilst 7.8 percent (n = 25) of the participants very often use this method. It was also revealed that 5 percent (n = 16) of the participants always use the Z-score method to identify credit risk. The analysis implies that the majority of the participants seldom use the Z-score method to identify credit risk in agricultural finance.

An instance-based method such as evaluating the tax returns and risk of individual loans of borrowers was also assessed by the participants. Participants from the commercial banks were asked to assess how often this method is used to identify credit risk in agricultural lending. Results from the data gathered revealed that 2.5 percent (8) of the participants never use the instance-based method to identify credit risk whilst 7.5 percent (n = 24) indicated that they seldom use the method to identify credit risk. It was also indicated that 14.4 percent (n = 46) of the participants sometimes use the instance-based approach whilst 45.5 percent (n = 145) of participants very often use this method. In addition, 30.1 percent (n = 96) of the participants confirm that they always use the instance-based method to identify credit risk. The results ultimately indicate that majority of the participants very often use the instance-based method of credit risk identification to identify credit risk in agricultural finance.

Table 5.2: Summary of Results on Credit Risk Identification Methods

Credit Risk Identification Methods	Never	Seldom	Sometimes	Very Often	Always
<i>A sensitivity analysis method is used to identify credit risk</i>	24	124	83	68	20
<i>The credit portfolio view method is used to identify credit risk</i>	14	48	60	69	128
<i>External audit checks are used to identify risk</i>	6	17	31	88	177
<i>Internal Audit checks are used to identify risk</i>	6	15	30	158	110
<i>An objective-based approach is used to identify credit risk</i>	8	19	50	177	65
<i>A scenario-based method is used to identify credit risk (knowing what can happen and the risk involved)</i>	21	33	73	152	40
<i>Credit Bureau reports are used to identify credit risk.</i>	36	158	61	47	17
<i>Tax returns for self-employed borrowers are used to identify credit risk.</i>	124	59	58	50	28
<i>A chart-based approach is used to identify credit risk</i>	13	64	161	60	21
<i>The risk management review process is used to identify credit risk</i>	4	13	38	98	166
<i>Consultative reviews from third parties are used to identify credit risk.</i>	8	57	147	68	39
<i>The Independent agency review approach is used to identify credit risk</i>	16	61	160	56	26
<i>Loan syndication method such as collaborating with other lenders to give loans to borrowers is used to identify credit risk</i>	145	82	32	36	24
<i>Credit Rationing methods such as actions taken to limited borrowers are employed to identify risk</i>	7	15	29	71	197
<i>Credit rating method such as predicting the ability to pay back the loans is used to identify credit risk</i>	3	14	31	84	187
<i>Z-score model, a mathematical approach that identifies the possibility of credit risk is used</i>	49	149	80	25	16
<i>An instance-based method such as evaluating the returns and risk of individual loans is used to identify credit risk</i>	8	24	46	145	96

Source: Author's estimates (2021)

5.3.1.1 Testing for Reliability and Sampling Adequacy-Credit Risk Identification Methods

Kaiser-Meyer-Olkin (KMO) sampling adequacy test and Bartlett's test of sphericity were used to assess the suitability of the data for analysis. The KMO sampling adequacy test predicts if data factors well (Wang, Rob, & Nigel, 2009). The KMO measure of value more than 0.6 is considered acceptable (Wang et al., 2009). Table 6.3 shows the KMO (Bartlett's test) test results indicating a measured value of 0.810 and a p-value of 0.000. Cronbach's Alpha coefficient exceeds ($\geq .70$) implies that there exists adequate reliability for group comparison. Since the KMO is greater than 0.6 and Bartlett's test p-value is less than 0.05, it means that the sampling is adequate and that the data used is measuring the intended objective of evaluating the credit risk identification methods of commercial banks in agricultural finance. This implies that the results are acceptable.

Table 5.3 Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.810
Bartlett's Test of Sphericity	Approx. Chi-Square	1535.535
	Df	136
	Sig.	.000

Source: Author's estimates (2021)

After the sampling adequacy and reliability test presented in Table 5.3, PCA was used to group the variables (the questions) into fewer components. The study adopted the Kaiser Eigenvalue criterion to decide which factors to retain. If the eigenvalue is greater than 1, the factor is retained (Nunnally & Bernstein, 1997). The variables with values greater than 0.5 and the highest loadings were the basis for assigning the new variable descriptions. Cronbach's coefficient alpha was used to test the reliability of the items' consistency. For an exploratory study, constructs that indicate higher than 0.5 are considered acceptable (Nunnally & Bernstein, 1997). The PCA grouped the methods used by commercial Banks to identify credit risks in agricultural finance into four components as shown in Table 5.4 and details indicated in Table 5.6. The variance of the four components accounts for 55.4 percent as indicated in Table 5.4.

Table 5.4 Total Variance Analysis, Credit Risk Identification Methods

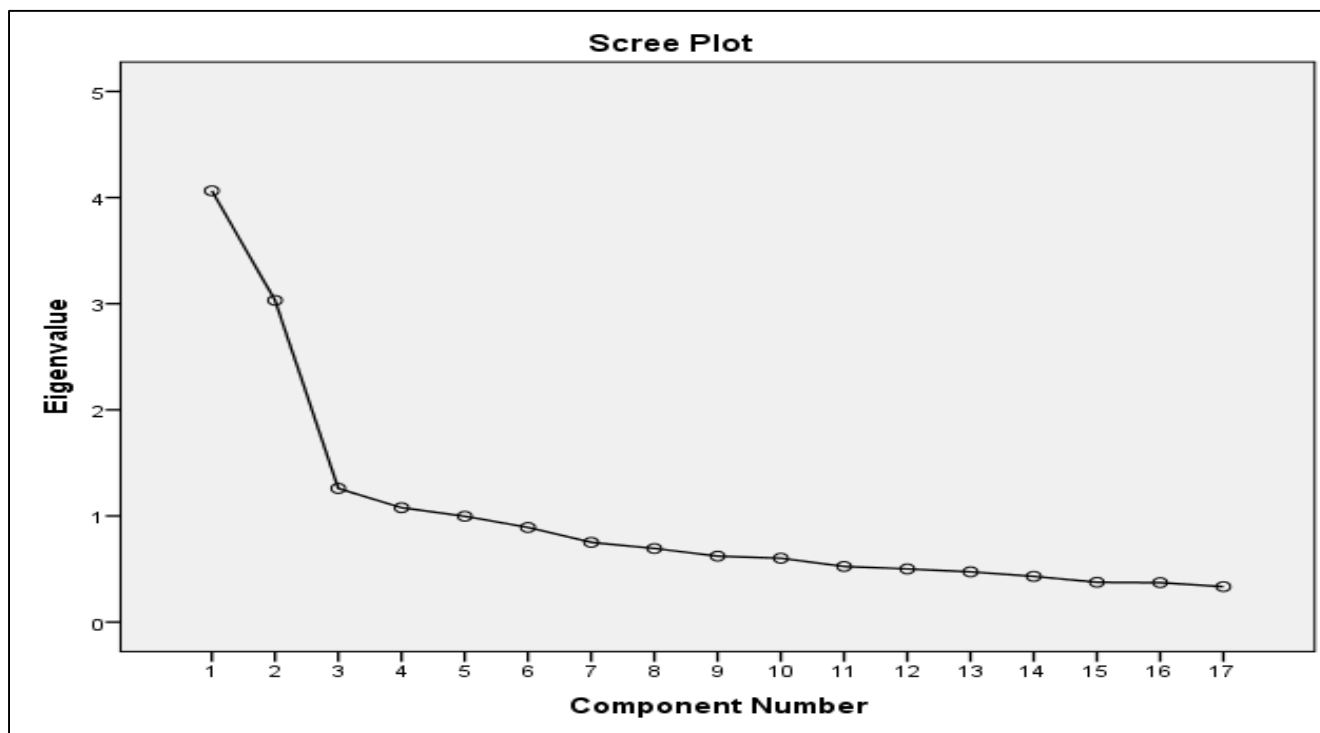
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.064	23.906	23.906	4.064	23.906	23.906	2.976	17.504	17.504
2	3.031	17.831	41.737	3.031	17.831	41.737	2.495	14.675	32.179
3	1.260	7.410	49.148	1.260	7.410	49.148	2.086	12.271	44.450
4	1.078	6.340	55.487	1.078	6.340	55.487	1.876	11.037	55.487
5	.997	5.865	61.352						
6	.892	5.246	66.598						
7	.751	4.420	71.018						
8	.694	4.080	75.097						
9	.621	3.655	78.752						
10	.602	3.540	82.292						
11	.524	3.084	85.377						
12	.501	2.946	88.323						
13	.473	2.784	91.107						
14	.431	2.535	93.641						
15	.375	2.206	95.847						
16	.372	2.188	98.035						
17	.334	1.965	100.000						

Extraction Method: Principal Component Analysis.

Source: Author's estimates (2021)

The eigenvalue-one criteria were considered in conjunction with the proportion of variance accounted for and scree plot before the components were retained. In Figure 2, the horizontal axis contains a list of component numbers whilst the Eigenvalues were listed on the vertical axis. Components with Eigenvalues greater than 1 indicated on the plot in Figure 2 were retained. Components 1 to 4 have their Eigenvalues greater than 1 and therefore are considered to be meaningful and hence retained for further analysis. The components appearing after the break indicated in Figure 2 were considered to be trivial. Even though the Eigenvalue of the fourth component is greater than 1, it appeared after the break and is considered a weak component.

Figure 2: Scree Plot of Components in Credit Risk Identification Methods



Source: Author's estimates (2021)

The study reviewed the correlation between the components and the individual variables. This information was used to interpret the four components retained. In other words, the review helped to determine the constructs which are measured by each of the four components for interpretation and discussion. For easy interpretation, a Varimax rotation¹⁷ is performed and results are displayed in Table 5.5.

Table 5.5: Component Transformation Matrix Component

Component	1	2	3	4
1	.746	-.563	-.139	.328
2	.312	.490	.695	.424
3	.499	.126	.196	-.835
4	.312	.654	-.678	.126

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Source: Author's estimates (2021)

The first component (Checks and Review) extracted consists of seven items as indicated in Table 5.6 with an Eigenvalue of 4.064 and Cronbach's alpha of 0.75. The items identified as variables that constitute the first components represent the credit risk identification methods that are commonly used among commercial banks in Ghana. They include External Audit Checks (Factor loadings = 0.627), Internal Audit Checks (factor loadings = 0.669), Risk Management Review Process (loadings = 0.505), Instance-Based method (such as evaluating the returns and risk of individual loans) (factor loadings = 0.567), Credit Rationing (loadings = 0.684), Credit Rating (factor loadings = 0.752) and objective-based method of risk identification (loadings = 0.409) indicated in Table 5.6.

The second component (Reports and Z-score) comprises four factors with an eigenvalue of 3.031 and Cronbach's alpha of 0.76 and a variance of 18.5 percent. These include Credit Bureau Reports, Tax Returns for Self-Employed Borrowers, and Loan Syndication Methods such as collaborations and Z-score methods with factor loadings of 0.747, 0.731, 0.613, and 0.710 respectively. The third component (Agency and Consultative View) identified comprises three factors with an Eigenvalue of 1.26, a variance of 7.4 percent, and Cronbach's alpha of 0.71. They include the Chart-Based Approach, Consultative Views from Third Parties, and Independent Agency Review Approach with factor loadings of 0.613, 0.747, and 0.669 respectively. The fourth Component (Analysis Method)

¹⁷ A rotation is a line transformation that is performed on factor solutions for the purpose of making the solutions easier to interpret (Konovalova et al., 2017).

consists of two factors with an Eigenvalue of 1.078, the variance of 6.3 percent, and Cronbach's alpha of 0.71. The factors in this component include sensitivity Analysis, the Credit Portfolio View Method, and a scenario-based method with respective factor loadings of 0.794, 0.745, and 0.532 indicated in Table 5.6.

5.3.1.2 Explanation of PCA Extracted Components, Credit Risk Identification Methods

When each variable such as a questionnaire item is given a weight to compute the principal component, then the variable loads on that particular component. The factor loading of the variables quantifies the extent to which the variables are related to a given component. Therefore, variables that load on the same component are classified into one group. Simply put, items that relate to one another are put into one group. The first component identified represents the method with the highest Eigenvalue considered by commercial banks to be more frequently used to identify credit risk in agricultural finance and hence considered to be more important than the other components. In this section, Checks and Review which has an Eigenvalue of 4.064 Variance of 24 percent; Cronbach's Alpha of 0.75 represents the first component identified as indicated in Table 5.6. This implies that Checks and Review is the most important and frequently used method by commercial banks to identify credit risk associated with agricultural finance. It means that most Ghanaian commercial banks use audit checks, the management review process, credit rationing, credit rating, and objective-based approach as the most important and frequently used methods to identify credit risk exposure in agricultural lending than any other methods. This is followed by the second component; reports and Z-score which comprised of credit bureau reports, tax returns for self-employed borrowers, loan syndication, and Z-score methods with an Eigenvalue of 3.031; Variance of 18 percent and Cronbach's alpha: 0.76. This indicates that these factors contained in the second component are not frequently used by commercial banks to identify credit risk in agricultural lending unless all methods in the first components are exhausted. Factors in the third component; Agency and consultative views such as chart-based, consultative views, and independent agency review approach with an Eigenvalue of 1.26; Variance of 7.4 percent and Cronbach's alpha range of 0.71 were identified as the third option methods used by commercial banks to identify credit risk in agricultural lending. Also, the

analysis method indicated as component 4 with Eigenvalue of 1.078; Variance of 6.3 percent and Cronbach's alpha of 0.64 comprised variables such as sensitivity analysis, credit portfolio view, and scenario-based approach were identified as the fourth option method used to identify credit risk associated with agricultural lending. This implies that the factors that constituted component four are the least used methods adopted by commercial banks to identify credit risk in agricultural lending. Variables with an Eigenvalue of less than 1 are regarded as trivial and insignificant.

The analysis verified the most frequently used methods adopted by Ghanaian commercial banks to identify credit risk associated with agricultural lending which is the initial objective of this study. Checks and reviews were identified as the first component representing the most frequently used methods adopted by Ghanaian commercial banks to identify credit risk in agricultural lending. It is therefore seen as the most significant credit risk identification method adopted by Ghanaian commercial banks to identify credit risk. Reports and the Z-score model represent the second most preferred credit identification method followed by agency and consultative view. The least preferred method used by the banks was the analysis method indicated in Table 5.6.

Table 5.6: Factor Analysis of Credit Risk Identification Methods

Factors	Loadings
Component 1: (Checks and Review)	
(Eigenvalues:4.064; Variance: 24%; Cronbach's alpha: 0.75)	
• External audit checks are used to identify credit risk	0.627
• Internal audit checks are used to identify credit risk	0.669
• The risk management review process is used to identify credit risk	0.505
• An instance-based method such as evaluating the returns and risk of the individual loan is used to identify credit risk	0.567
• Credit Rationing method such as actions taken to limit borrowers is used to identify credit risk	0.684
• Credit rating mechanism method such as predicting the ability to pay back the loan is used to identify credit risk	0.752
• An objective-based risk approach is used to identify credit risk	0.409
Component 2: (Reports and Z-score)	
(Eigen values:3.031; Variance: 18%; Cronbach's alpha: 0.76)	
• Credit bureau reports are used to identify credit risk	0.747
• Tax returns for self-employed borrowers are used to identify credit risk	0.731
• Loan syndication method such as collaborating with other lenders to grant loans to borrowers is used to identify credit risk	0.613
• Z-score model; a mathematical approach that identifies the possibility of credit risk is used	0.710
Component 3: (Agency and Consultative)	
(Eigen values:1.26; Variance: 7.4%; Cronbach's alpha: 0.71)	
• A chart-based approach is used to identify credit risk	0.613
• Consultative views from third parties are used to identify credit risk	0.747
• The Independent agency review approach is used to identify credit risk	0.668
Component 4:(Analysis Methods)	
(Eigen values:1.078; Variance: 6.3%; Cronbach's alpha: 0.64)	
• A sensitivity analysis method is used to identify credit risk	0.794
• The credit portfolio view method is used to identify credit risk	0.745
• A scenario-based method is used to identify credit risk (knowing what can happen and the risk involved)	0.532
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.810
Bartlett's Test of Sphericity (p-value)	1535.53(0.000)
% of the total variance explained	55.49%

Source: Author's estimates (2021)

5.3.2 Results on the Effectiveness of the Implementation of Credit Risk Management Policies

The second research objective was to examine how credit risk management policies are implemented by Commercial Banks in agricultural finance to minimize credit risk exposure. This objective sought to determine the effectiveness of credit risk implementing policies in commercial Banks to mitigate credit risk in agricultural finance. To achieve this objective, a list of 15 questions on the implementation of credit risk management policies were generated for the participants to indicate how often or not these policies are applied to minimize credit risk exposure of commercial banks in agricultural finance. A Likert-type scale was used as a measurement indicator for all questions where Never = 1, Seldom = 2, Sometimes = 3, Very often = 4 and Always = 5. Table 5.7 provides details of participants' responses on the implementation of credit risk management policies in commercial banks. Cronbach's alpha ranged from 0.79 to 0.89 indicating that the factors are well grouped, reliable, and suitable for analysis. It means that the result is valid and reliable for analysis and comparison

A descriptive analysis of the implementation of credit risk management policies in commercial banks was computed. When participants were asked to indicate whether loan appraisal processes are applied in the granting of credits requested by borrowers for agricultural purposes, it was indicated that 2.5 percent (n = 8) of the participants never and seldom apply the loan appraisal process in the granting of credits for agri-businesses. In addition, it was also found that 4.7 percent (n = 15) of the sample population sometimes apply the loan appraisal processes whilst 29.8 percent (n = 95) very often apply the process. 60.50 percent (n=193) of the remaining participants indicated in all cases that, loan appraisal processes are applied in the granting of credits. The results imply that many of the credit officers in commercial banks apply the loan appraisal processes before credits are given to borrowers for agricultural purposes.

Participants were also asked to indicate how loan authorization procedures are applied in the granting of credits to the agricultural sector. It was found that 1.3 percent (n = 4) never apply the loan authorization procedure whilst 2.5 percent (n = 8) seldom apply this procedure. It was further noted that 4.1 percent (n = 13) of the participants sometimes apply the procedure whilst 32.6 percent (n = 104) very often apply this procedure in granting loans to the agricultural

sector. In addition, 59.6 percent (n = 190) of the participants always apply the loan authorization procedure in the granting of loans for agricultural purposes. It suggests that 92.2 percent (294) of participants very often and always apply the loan authorisation procedures in the granting of credits in Commercial Bank to borrowers for agricultural purposes. This means that loan authorisation processes are effectively implemented by Ghanaian commercial banks in granting loans for agricultural purposes. Following this, participants were asked to indicate how often approval processes are followed in credit granting the loan. Results from the data gathered indicated that 0.9 percent (n = 3) never and seldom follow the loan approval process in the granting of credits for agricultural purposes in the commercial Banks whilst 6.3 percent (n = 20) sometimes follow the process. 35.7 percent (n = 114) of the participants indicated that they sometimes follow the process whilst 56.1 percent (n = 179) indicated that, the process is always followed. This indicates that most credit officers in commercial banks follow the credit approval process in the granting of loans in agricultural finance. By implication, more than 50 percent of credit officers in commercial banks effectively implement loan approval processes in the granting of agricultural loans.

A question was asked whether credit limit review of borrowers is applied in granting of credit. It was found that 1.3 percent (n = 4) of the participants never and seldom review the credit limit of borrowers before granting credit meant for agricultural purposes whilst 8.5 percent (n = 27) of the participants indicated that they sometimes review the credit limit of borrowers in agricultural lending. It was further revealed that 35.4 percent (n = 113) of credit officers very often review the credit limit of borrowers. In addition, 53.6 percent (n = 171) of the participants attested that the credit limit of borrowers is always reviewed in the credit granting process. This confirms that the majority of credit officers in commercial banks review the credit limit of borrowers before granting loans in agricultural finance. Credit officers were again asked to indicate how often collateral is required from borrowers in the granting of credit for agricultural purposes. Results gathered indicate that 1.3 percent (n = 4) of the participants indicated never whilst 4.1 percent (n = 13) of the participants indicated seldom. Adding, 13.5 percent (n = 43) of the participants indicated that they sometimes require collateral from borrowers before granting credits for agricultural purposes. It was again revealed that 34.2 percent (n = 109) of the participants indicated they very often require collateral whilst 47 percent (n = 150) of the credit officers affirmed that they always demand collateral as a requirement. The results

showed that most credit officers in commercial banks require collateral from borrowers before granting credits to the agricultural sector. This implies that the collateral requirement by Ghanaian commercial banks in agricultural lending complies with the BoG policies regulations for banks. This however affects most agricultural borrowers in Ghana since most of the small borrowers have no collateral to support loan requests. Participants were further asked to indicate how often loans are insured with insurance companies or agents against possible losses. 1.6 percent (n = 5) of the participants indicated that they never insure the loans granted for agricultural purposes whilst 4.1 percent (n = 13) indicated that they seldom insure agricultural credits. It was further indicated that 5 percent (n = 16) of the participants posit that they sometimes insure their loans with insurance companies. Also, 33.5 percent (n = 107) of the participants indicated that they very often insure agricultural credits whilst 55.8 percent (n = 178) attested that loans for agricultural purposes are always insured with insurance companies or agents against possible losses. It means that most commercial Banks in Ghana ensure their loans with insurance companies or agents against possible losses to minimize credit risk associated with agricultural lending. This complies with the policy requirement of BoG for commercial banks in Ghana in minimizing credit losses.

The capacity of borrowers was assessed as a key indicator of credit risk management policy implementation in commercial banks. It was found that 1.3 percent (n = 4) of the participants never consider the capacity of borrowers before granting loans whilst 1.9 percent (n = 6) of the participants indicated seldom. 8.8 percent (n = 28) of the participants sometimes grant loans based on the capacity of borrowers whilst 38.9 percent (n = 124) of the participants very often grant agricultural loans based on borrowers' capacity. It was again noted that 49.2 percent (n = 157) of the participants indicated that, commercial Banks always grant loans based on borrowers' capacity. The results imply that the majority of credit officers consider the capacity of borrowers in the granting process of loans for agricultural activities. This is good for both the banks and the borrowers as it reduces loan losses for commercial banks whilst improving the businesses of the borrowers.

Regarding the appraisal of borrowers' creditworthiness before the granting of credits for agricultural purposes, 0.6 percent (n = 2) of the participants indicated that borrowers are never appraised to ascertain if they are creditworthy whilst 1.9 percent (n = 6) of the participants

indicated borrowers are seldom appraised. It was found further that, 8.8 percent (n = 28) of the participants sometimes appraise the creditworthiness of borrowers before granting credits whilst 49.2 percent (n = 157) of the participants always appraised the creditworthiness of borrowers during the credit granting process. Making deductions from this data, the majority of the credit officers in commercial banks appraise the creditworthiness of borrowers before granting credits in agricultural finance. This implies that borrowers with bad creditworthiness would be spotted during the appraisal process and minimize loan losses. This is significant as it improves the cash flow of commercial banks.

Participants were also asked to indicate how often restrictive covenants are effectively enforced in granting of loans for finance agriculture. It was found that 1.6 percent (n = 5) of the participants never effectively enforce restrictive covenants in the granting of loans whilst 10.3 percent (n = 33) of the participants seldom enforce them. It was also discovered that 16.9 percent (n = 54) of the participants sometimes effectively enforce restrictive covenants whilst 46.1 percent (n = 147) of the participants indicated that restrictive covenants are effectively enforced in the granting of loans. 25.1 percent (n = 80) of the participants indicated that restrictive covenants are always effectively enforced. The results imply that most of the credit officers in commercial banks effectively enforce restrictive covenants in the granting of loans. This is expected to prevent loan losses thereby increasing the performance of commercial banks and reduce credit risk exposure in agricultural lending.

The same participants were asked to indicate how often the credit register is assessed before credits are granted. Results indicate that 1.3 percent (n = 4) of the participants never assess the credit register before granting loans whilst 4.7 percent (n = 15) of the participants seldom assess the register before loans are granted. Also, 16 percent (n = 51) of the participants indicated that credit register is sometimes used before granting of loans whilst 46.1 percent (n = 147) of the participants attested that credit register is very often assessed in the loan granting process. It was further found out that 32 percent (n = 102) of the participants indicated that credit register is always assessed before granting credit for agricultural purposes.

The next question sought to establish how far the character of borrowers was also assessed to ascertain how often credit officers consider it during the granting of credits for agricultural purposes. Results from the data gathered indicated that 3.8 percent (n = 12) of the participants

indicated that, the character of borrowers is never considered in the credit granting process whilst 7.2 percent (n = 23) of the participants declared that the character of borrowers is seldom considered in the granting of credits. Also, 32 percent (n = 102) of the participants in commercial banks indicated that the borrower's character is sometimes considered in the credit granting process whilst 35.1 percent (n = 112) of the participants very often consider the character of borrowers. It was further confirmed that 21.9 percent (n = 70) of the participants indicated that the character of borrowers is always considered before granting credits. The results portrayed that the majority of the credit officers in commercial banks consider the character of borrowers before granting to the agricultural sector. This implies that loan losses can be minimised if commercial banks advance agricultural loans to borrowers with good outstanding character. This is good for commercial banks because it is practically difficult to recover loans that fall into the wrong hands. Another area that concerns the implementation of credit risk management policy that was assessed was to determine how often credit manuals are used by commercial banks to guide in the granting of credits. Results from the data sourced indicated that 1.9 percent (n = 6) of the participants in commercial banks never use the credit manual in the loan granting process whilst 6.6 percent (n = 21) of the participants seldom use the credit manual as a guide. In furtherance, 23.2 percent (n = 74) of the participants confessed that credit manuals are sometimes used whilst 47 percent (n = 150) posit that credit manuals in commercial banks are very often used in the loan granting process. It was also indicated that 21.3 percent (n = 68) of the participants attested that credit manuals are always used in the granting of credits for agricultural activities. The results generally indicate that majority of the credit officers in commercial banks make use of the credit manuals during the credit granting process.

Also, the study assessed how often the credit history of borrowers is considered in the granting of credits. 2.8 percent (n = 9) of the participants were of the view that the credit history of borrowers is never considered in the credit granting process whilst 3.4 percent (n = 11) of the participants indicated that borrowers' credit history is seldom considered. Also, 17.2 percent (n = 55) of the participants indicated that the credit history of borrowers is sometimes considered whilst 47 percent (n = 150) of the participants declared that the credit history of borrowers is very often considered before granting loans. Also, 29.5 percent (n = 94) of the participants were of the view that the credit history of borrowers is always considered in the

credit granting process. The results evidenced that most credit officers in commercial Banks consider the credit history of borrowers in granting agricultural credits.

Also, participants were asked to indicate whether or not credit disbursement review processes cover compliance with internal guidelines. The results indicate that 1.3 percent (n = 4) of the participants attested had the view that, credit disbursement review never covers compliance with internal guidelines whilst 2.5 percent (n = 8) attested that the credit disbursement review process seldom covers compliance with internal guidelines. Also, 12.5 percent (n = 40) of the participants responded that credit disbursement review sometimes covers compliance with internal guidelines whilst 36.4 percent (n = 116) of the participants indicated that credit disbursement review very often covers compliance with an internal guideline when finance agricultural. It was further indicated by 47.3 percent (n = 151) of the participants that the credit disbursement review process always complies with internal guidelines. Referring to the results, it can be concluded that credit disbursement reviews in commercial Banks most of the time cover compliance with internal guidelines in an attempt to mitigate credit risk exposure in agricultural finance.

Lastly, participants were asked to indicate how often credit granting processes are monitored to ensure compliance with relevant laws and regulations in agricultural finance. Results from the data gathered indicated that 0.9 percent (n = 3) of the participants perceived that compliance with relevant laws and regulations is never monitored in the credit granting process in commercial banks whilst 2.2 percent (n = 7) of the participants indicated compliance with the relevant laws and regulations is seldom monitored. It was further indicated by 4.4 percent (n = 14) of the participants that, compliance with relevant laws and regulations in commercial banks is sometimes monitored to ensure whilst 32.9 percent (n = 105) of the participants responded that compliance with relevant laws and regulations is very often monitored in the credit granting processes. It was also found that 59.6 percent (n = 190) of the participants from the commercial banks viewed that compliance with the relevant laws and regulations is always monitored during the credit grating process in commercial banks. The results imply that majority of credit officers in commercial banks very often and always monitor compliance with relevant laws and regulations during the credit-granting process in agricultural finance.

Table 5.7: Results on the Implementation of Credit Risk Management Policies

Implementation of Credit Risk Management Policies	Never	Seldom	Sometimes	Very often	Always
<i>Loan appraisal processes are applied in the granting of credits.</i>	8	8	15	95	193
<i>Loan authorization procedures are followed in the granting of credits.</i>	4	8	13	104	190
<i>Application of the loan approval process.</i>	3	3	20	114	179
<i>A credit limit review of borrowers is applied in the granting of credits.</i>	4	4	27	113	171
<i>Collateral is required in the granting of credits</i>	4	13	43	109	150
<i>Loans are insured with insurance companies or agents against possible losses</i>	5	13	16	107	178
<i>Loans are guaranteed based on borrowers' capacity</i>	4	6	28	124	157
<i>Borrowers' creditworthiness is appraised before granting credits.</i>	2	8	25	105	179
<i>Restrictive covenants are effectively enforced in granting loans.</i>	5	33	54	147	80
<i>The credit register is assessed before granting credits</i>	4	15	51	147	102
<i>The character of borrowers is considered in the granting of credits.</i>	12	23	102	112	70
<i>Credit manuals are used in the granting of credits.</i>	6	21	74	150	68
<i>The credit history of the borrower is considered in the granting of credits.</i>	9	11	55	150	94
<i>A credit disbursement review covers compliance with internal guidelines.</i>	4	8	40	116	151
<i>Compliance with relevant laws and regulations is monitored in the credit granting process.</i>	3	7	14	105	190

Source: Author's estimates (2021)

5.3.2.1 Testing for Reliability and Sampling Adequacy-Implementation of Credit Risk Management Policies

Kaiser-Meyer-Olkin (KMO) sampling adequacy and Bartlett's test of sphericity were used to assess the suitability of the data for this objective. The KMO test in Table 5.8 showed 0.899 and a P-value of 0.000 indicating that the sample was adequate for this objective. Cronbach's alpha ranged from 0.79 to 0.89 indicating that the factors are well grouped, reliable, and suitable for analysis. This implies that the results are valid and reliable for comparison.

Table 5.8: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.899
Bartlett's Test of Sphericity	Approx. Chi-Square	1882.206
	Df	105
	Sig.	.000

Source: Authors' estimates (2021)

The PCA results of the effectiveness of the implementation of credit risk management policies in commercial banks in Table 5.9 indicate that the implementation of credit risk management policies in commercial Banks can be grouped into two main components. The total variance explained is 52.19 percent indicated in Table 5.9. As indicated in section 5.3.1.1, constructs that indicate higher than 1 are considered for an exploratory study of this kind. The PCA grouped the variables for the effectiveness of the implementation of credit management into two indicated in Table 5.9. The variance of the two components accounts for 52.2 percent as indicated in Table 5.4.

Table 5.9 Total Variance Analysis, Implementation of Credit Risk Management Policies

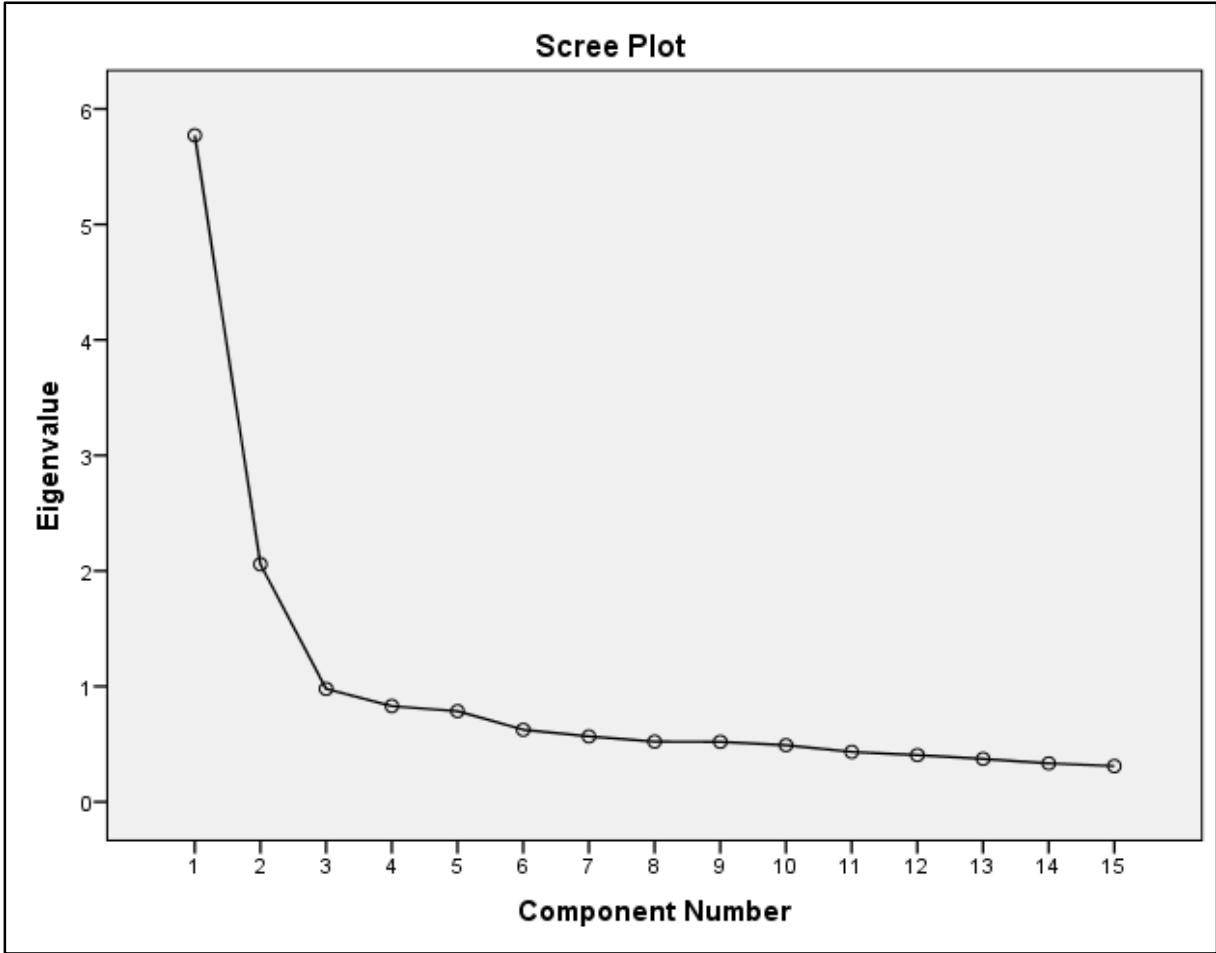
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.772	38.477	38.477	5.772	38.477	38.477	4.973	33.151	33.151
2	2.057	13.715	52.192	2.057	13.715	52.192	2.856	19.041	52.192
3	.979	6.524	58.716						
4	.830	5.532	64.248						
5	.786	5.238	69.486						
6	.624	4.163	73.649						
7	.567	3.778	77.427						
8	.522	3.480	80.908						
9	.520	3.466	84.374						
10	.491	3.271	87.645						
11	.433	2.884	90.528						
12	.405	2.703	93.231						
13	.372	2.480	95.711						
14	.334	2.224	97.934						
15	.310	2.066	100.000						

Extraction Method: Principal Component Analysis.

Source: Authors' estimates (2021)

The two components were retained in line with the eigenvalue-one criteria, the proportion of variance accounted for, and the scree plot. As indicated in Figure 3, the horizontal axis contains a list of component numbers whilst the Eigenvalues were enumerated on the vertical axis. Components that have Eigenvalues higher than 1 indicated on the plot in Figure 3 were retained. These two components are considered meaningful and relevant for discussion. All other components with Eigenvalues less than 1 are regarded as irrelevant. In Figure 3, the irrelevant components are those appearing after the break on the plot.

Figure 3: Scree Plot of Components in Credit Risk Policy Implementation



Source: Authors' estimates (2021)

The study reviewed the correlation between the components and the individual variables. This information is used to interpret the four components retained. In other words, the review helps determine the constructs which are measured by each of the four components for interpretation.

Table 5.10 Component Transformation Matrix

Component	1	2
1	.886	.464
2	-.464	.886

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Source: Author's estimates (2021)

From the results, two components were identified as the most frequently used and important credit risk implementation tools in agricultural finance. The first component (Compliance, insurance, and Creditworthiness) representing the most commonly used credit risk management implementation policies to minimize credit risk exposure of commercial banks consist of ten factors with an eigenvalue of 5.77, variance explained of 38.5 percent, and a Cronbach's alpha of 0.89.

The factors that made up the first component were identified as Application of Loan Appraisal Processes with factor loadings of 0.688, Application of Loan Authorisation Procedures with factor loadings of 0.726, Application of Loan Approval Process with factor loadings of 0.783, Credit Limit Review of Borrowers (loads, 0.687), Collateral Requirement of Borrowers (loads, 0.666), and Insurance of Loans with factor loadings of 0.699. The others include Borrowers' Capacity with factor loads of 0.699, Borrowers' Credit Worthiness with loads of 0.675, Credit Disbursement Review with loads of 0.618, and Compliance with Relevant Laws and Regulations with loads of 0.655 shown in Table 6.11.

The second component named Restrictions and History of borrowers for this study comprises five factors with an eigenvalue of 2.05, variance explained of 13.7 percent, and Cronbach's alpha of 0.79. The factors include use of Restrictive Covenants indicating factor loads of 0.590, Assessment of Credit Register with factor loads of 0.666, Consideration of Character of Borrowers with factor loads of 0.796, Use of Credit Manuals with factor loads of 0.801, and Consideration of the Borrowers' Credit History with factor loads of 0.711.

5.3.2.2 Explanation of PCA Extracted Components, Implementation of Credit Risk Management Policies

Factor loadings and groupings were described in section 5.3.2.1. In evaluating objective two which involves the effectiveness of the implementation of credit risk management policies, two major components were extracted in order of importance and how frequently these components are used by commercial banks. The first component identified represents the most significant and regularly used component adopted by commercial banks in Ghana. The first component extracted is the one with the highest Eigenvalue. In this section, the first component extracted is compliance, Insurance, and Creditworthiness with an Eigenvalue of 5.77 and follows by restriction and History of borrowers with an Eigenvalue of 2.05 indicated in Table 5.11. Components with Eigenvalues of less than 1 were not considered relevant in this section.

Table 5.11 Results on Credit Risk Management Policy implementation.

Factors	Loadings
Component 1:(Compliance, insurance, and Creditworthiness)	
<i>(Eigenvalues:5.77; Variance: 38.5%; Cronbach's alpha: 0.89)</i>	
• <i>Loan appraisal processes are applied in the granting of credits.</i>	0.688
• <i>Loan authorization procedures are applied in the granting of credits</i>	0.726
• <i>Loan approval processes are followed in the granting of credits.</i>	0.783
• <i>Credit limit review of borrowers is applied in granting credits</i>	0.687
• <i>Collateral is required from borrowers in the granting of credits</i>	0.666
• <i>Loans are insured with insurance companies or agents against possible losses</i>	0.699
• <i>Loans are granted based on borrowers' capacity.</i>	0.675
• <i>Borrowers creditworthiness is appraised before granting credits</i>	0.664
• <i>Credit disbursement review covers compliance with internal guidelines.</i>	0.618
• <i>Compliance with relevant laws and regulations are monitored in the credit granting process</i>	0.655
Component 2: (Restrictions and History of borrowers)	
<i>(Eigenvalues:2.05; Variance: 13.7%; Cronbach's alpha: 0.79)</i>	
• <i>Restrictive covenants are effectively enforced in granting loans</i>	0.590
• <i>Credit register is assessed before granting credit</i>	0.666
• <i>The character of borrowers is considered in the granting of credits</i>	0.796
• <i>Credit manuals are used in the granting of credits</i>	0.801
• <i>The credit history of borrowers is considered in the granting of credits</i>	0.711
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.899
Bartlett's Test of Sphericity(p-value)	1882.21(0.00)
Percentage of the total variance explained	52.19%

Source: Author's estimates (2021)

5.3.3 Results on the Effectiveness of Credit Risk Mitigation Strategies

The last research objective was designed to examine the effectiveness of credit risk management strategies used by commercial Banks in agricultural finance. This objective sought to ascertain the effectiveness of the strategies adopted by commercial banks to minimize credit risk in agricultural finance. To achieve this objective, a list of 17 questions was crafted on the strategies used by commercial Banks to mitigate credit risk associated with the finance of agricultural activities. A Likert-type scale was again designed as a measurement indicator for all questions where Never = 1, Seldom = 2, Sometimes = 3, Very often = 4, and Always = 5. Since the KMO test produced results of 0.892 indicated in Table 5.13 and Cronbach's alpha ranged from 0.75 to 0.88 it means that the data collected is adequate and reliable for comparison.

Participants from commercial banks were asked to indicate whether credit officers regularly identify loan distress signals as one of the strategies that can be used to minimize credit risk. Results from the data gathered indicated that 4.1 percent (n = 13) of credit officers never regularly identify loans with distress signals whilst 8.2 percent (n = 26) indicated that loan distress signals are seldom regularly identified. Also, 6.9 percent (n = 22) of the participants responded that loan distress signals are sometimes regularly identified whilst 28.5 percent (n = 91) attested that loan distress signals are very often regularly identified. It was further noted by 52.4 percent (n = 159) of the participants that loan distress signals are always regularly identified. The results imply that the majority of credit officers in commercial banks very often and regularly identify loan distress signals in agricultural finance. This means that commercial banks would be able to plan and avert the negative consequences of loan losses if loans with bad signals are regularly spotted. This demands regular monitoring and supervision of loans granted to borrowers for agricultural purposes.

Following this, participants were assessed on the regular review of loan portfolio quality. 1.9 percent (n = 6) of the participants responded that the loan granting process in commercial banks is never regularly reviewed whilst 3.8 percent (n = 12) of the participants indicated that the granting process of loans is seldom regularly reviewed. 10 percent (n = 32) of the participants indicated that the loan granting process is sometimes

regularly reviewed whilst 34.5 percent (n = 110) affirmed that, the loan granting process is very often regularly reviewed. It was also noted from the results that 49.8 percent (n = 159) affirmed that, loan granting process is always reviewed. With these results, the majority of the participants were of the view that the loan granting process is very often and always regularly reviewed in agricultural finance. This implies that Ghanaian commercial banks most often review the processes used in granting agricultural credits as a strategy to minimize credit risk exposure associate with agricultural lending. This is good for the banks because non-compliance with policy requirements can be spotted during the credit granting process.

Another strategy that was assessed for effectiveness to minimize credit risk in commercial banks is the review of loan portfolio quality. Credit officers were asked to assess whether there is a regular review of portfolio quality in commercial banks when granting loans for agricultural purposes. The results from the data gathered indicated 1.3 percent (n = 4) of the participants confirm that loan portfolio quality is never regularly reviewed whilst 4.7 percent (n = 15) of the participants indicated that, loan portfolio quality is seldom regularly reviewed. In addition, 11.3 percent (n = 36) of the participants confirmed that loan portfolio quality is sometimes regularly reviewed whilst 33.5 percent (n = 107) indicated that loan portfolio quality is very often regularly reviewed. It was further stated that by 49.2 percent (n = 157) of the credit officers that loan portfolio quality is always regularly reviewed. The results imply that majority of the participants in commercial banks are of the view that portfolio quality of loans is very often and always regularly reviewed in agricultural finance. By this implication, it means therefore that bad portfolio quality resulting from bad loans associated with agricultural lending is easily identified since commercial banks review the quality of their loan portfolios on regular basis. Through this action, this credit risk can be mitigated and encourage agricultural lending as a viable business.

Also, participants were expected to assess how often employees' credit skills are regularly reviewed as one of the strategies that can be used to minimize credit risk exposure of commercial Banks. 8.5 percent (n = 27) of the participants indicated that employees' credit skills are never regularly reviewed whilst 46.4 percent (n = 148) of the participants indicated that employees' credit skills are seldom regularly reviewed. There were

indications from 12.5 percent (n = 76) of the participants that employees' credit skills are sometimes reviewed. As 12.5 percent (n = 40) of the participants view that employees' credit skills are very often reviewed, 8.8 percent (n = 28) of the participants indicated that employees' credit skills are always regularly reviewed. Resulting from the above, it can be concluded that the majority of credit officers from commercial banks posit that employees' credit skills are never and seldom reviewed as a means to mitigate credit risk exposure in agricultural finance. This implies that Ghanaian commercial banks have not been effectively reviewing do not take review skills and experiences of their credit officers. This is dangerous for commercial banks because these credit officer's adequate and competent skills to administer and monitor loan granting activities to minimize credit losses.

Attempting to find how often the credit administration process is regularly reviewed as a strategy adopted by commercial Banks in minimising credit risk exposure, 1.3 percent (n = 4) of the participants concluded that, credit administration process is never reviewed whilst 5 percent (n = 16) of the participants attested that credit administration process is seldom regularly reviewed. Also, 14.4 percent (n = 46) of the participants indicated that the credit administration process is sometimes reviewed in commercial banks in agricultural finance whilst 32.6 percent (n = 104) of the participants indicated that the credit administration process is very often reviewed. At the same time, 46.7 percent (n = 149) of the participants indicated that the credit administration process is always regularly reviewed. This implies that the majority of credit officers in commercial banks very often and always review the credit administration process in administering loans to borrowers for agricultural purposes. However, it should be noted that regular review of the credit administration processes by credit officers lacking credit administration skills can still result in credit administration risk management problems.

Credit report of borrowers is another strategy that was identified for participants to indicate their thought on how it is regularly reviewed. It was found that 2.8 percent (n = 9) of the participants affirm credit reports of borrowers are never regularly reviewed whilst 4.1 percent (n = 13) of the participants indicated they are seldom reviewed. 11.6 percent (n = 37) of the participants indicated that they are sometimes reviewed as 38.6 percent (n =

123) indicated that they are very often reviewed. Also, 42.9 percent (n = 137) of participants registered their view that credit reports of borrowers are always regularly reviewed. Considering this result, it means that the majority of participants (80%, 255) in commercial banks perceive credit reports of borrowers as very often and always regularly reviewed in agricultural lending. This implies that borrowers with bad credit reports would easily be identified and monitored by commercial banks to minimize loan losses. However, the addressing system of Ghana is not very robust making it difficult for credit bureau institutions to capture all information about borrowers where their credit report can also be generated.

Regarding the performance profile of borrowers, 2.8 percent (n = 9) of the participants viewed that, borrowers, performance profile is never regularly reviewed whilst 3.8 percent (n = 12) of the participants indicated that borrowers' performance profile is seldom regularly reviewed. It was further indicated by 14.4 percent (n = 46) of the participants viewed that borrowers' performance profile is sometimes reviewed whilst 38.9 percent (n = 124) of the participants indicated that borrowers' performance is very often reviewed as compared to 40.1 percent (n = 128) of the participants who stated that the performance profile of borrowers is always regularly reviewed. Indicating from the above, it implies that most of the participants in commercial banks very often and regularly review the performance profile of borrowers before granting loans for agricultural purposes. This means that commercial banks can easily identify potentially bad loans at an early stage through regular review of borrowers' performance profiles. It is significant, therefore, that commercial banks regularly review the performance of borrowers before and after agricultural credits are advanced to mitigate credit risk exposure.

To ascertain how proper credit-related transactions are documented, 1.9 percent (n = 6) of the participants indicated that credit-related transactions are never properly documented whilst 1.3 percent (n = 4) of the participants perceived that they are seldom properly documented. By extension, 6.6 percent (n = 21) of the participants said that credit related-transactions are sometimes properly documented whilst 37.6 percent (n = 120) of the participants attested that they are very often properly documented. It was further established that 52.7 percent (n = 168) of the participants that credit related-transactions

are always properly documented. This analysis confirmed that the majority of credit officers in commercial banks indicated that credit-related transactions are very often and always properly documented in the agricultural finance process. This is significant for the banks as it helps evaluate performing and non-performing loans as a viable strategy to mitigate credit losses.

Sourcing for participants' view on regular monitoring of collateral transactions used for the acquisition of loans for agricultural purposes, 9.1 percent (n = 29) of the participants indicated that collateralized transactions are never monitored whilst 47.3 percent (n = 151) participants opined that they are seldom monitored. It was also detected that by 14.1 percent (n = 45) participants that collateralized transactions are sometimes monitored as compared to 13.8 percent (n = 44) participants who suggested that these transactions are very often monitored. 15.7 percent (n = 50) of participants were of the view that collateralized transactions are always monitored. From the results, most credit officers in commercial banks never and seldom monitor collateralized transactions. This implies that it is practically difficult for Ghanaian commercial banks to fall on collateral as a basis for recovering loan losses. This is because little attention is placed on collateralized transactions which might be the only guarantee for some of the loans contorted by agricultural borrowers and might lead to loan losses.

Checking for repayment of loans on time is a key strategy in reducing the effects of non-performing loans in commercial banks when lending to the agricultural sector. As a result, participants were asked to indicate how often the credit department checks for the repayment of the loan on time to minimize defaults. Results from the 2.8 percent (n = 9) of the participants indicated that the credit department never checks that loans are repaid on time whilst 3.1 percent (n = 10) of the participants viewed that the credit department seldom checks for on-time repayment of loans. It was further noted by 7.8 percent (n = 25) of the participants that the credit department sometimes checks for the repayment of loans on time whilst 33.5 percent (n = 107) of the participants indicated that the credit department very often checks for the repayment of loans on time. Further, 52.7 percent (n = 168) of the participants from commercial banks indicated that the credit department always checks that loans are repaid on time to reduce loan losses. Judging from this

analysis, it can be concluded that the majority of credit officers view that credit officers in commercial banks very often and always checks for repayment of loans giving for agricultural purposes to minimize credit risk exposure. This implies that Ghanaian commercial banks most often than not check for repayment of loans by the borrowers. This strategy is significant for commercial banks as it minimizes credit losses, reduces credit risk, and improves the cashflow of the banks.

As another strategy to minimize credit losses in agricultural finance, participants were asked to indicate whether the credit department regularly identifies loans with potential credit weaknesses that can cause repayment problems. Responses from 2.8 percent (n = 9) participants indicated that the credit department never regularly identifies loans with potential credit weaknesses that can cause repayment problems whilst 4.7 percent (n = 150) indicated that the credit department seldom identifies loans with potential credit weaknesses. Whilst 8.5 percent (n = 27) were of the view that the credit department sometimes identifies loans with potential credit weaknesses, 37.9 percent (n = 121) of the participants indicated that loans with potential credit weaknesses are very often identified by the credit department. It was also found that 46.1 percent (n = 147) of the participants indicated that the credit department always identifies loans with potential credit weaknesses. The results imply that most credit officers in commercial banks very often and always identify loans with potential credit weaknesses that can cause repayment problems in agricultural finance. This means that loan repayment challenges would be minimized if commercial banks regularly identify loans with potential weaknesses to minimize credit losses.

When asked whether the overall quality of the loan portfolio is assessed on a timely basis, 2.8 percent (n = 9) of the participants indicated never whilst 4.4 percent (n = 9) of the participants indicated seldom. Also, 11 percent (n = 35) of the participants indicated that the overall quality of loan portfolio is sometimes assessed on a timely basis as compared to 39.8 percent (n = 127) of the participants who indicated that the overall quality of loan portfolio is very often assessed on time. Following, 42 percent (n = 134) of the participants indicated that the overall quality of the loan portfolio is always assessed on a timely basis. The results indicated that the majority of the participants were of the view that the portfolio

quality of a loan in commercial banks is assessed on a timely basis. It implies that commercial banks effectively used loan portfolio quality assessment as a significant strategy to mitigate credit risk associated with agricultural lending. This is very significant for commercial banks since this strategy provides the chance to improve loan collection and improve the overall quality of loan portfolios. As part of the questions, participants were asked to indicate how often credit officers are regularly trained to minimize credit risk exposure of commercial banks. Also, 8.8 percent (n = 28) of the participants indicated that credit officers are never trained whilst 48.3 percent (n = 154) of the participants indicated that they are seldom trained. In another instance, 21.9 percent (n = 70) of the participants indicated that credit officers are sometimes trained as compared to 10 percent (n = 32) of participants who attested that they are very often trained. In addition, 11 percent (n = 35) of the participants indicated that credit officers are always regularly trained. Resulting from the analysis, it can be said that most credit officers are never and seldom trained in commercial banks in agricultural finance in an attempt to minimize the risk associated with agricultural finance. This implies that Ghanaian commercial banks lack adequate training for credit officers who administer and manage agricultural-related credit transactions. This is dangerous considering that, these credit officers are the main players in agricultural lending and loan recovery and need adequate training on the job to give out their best to mitigate credit risk.

To manage credit risk effectively, risk management practices must be regularly reviewed. In an attempt to obtain participants view on how regular credit risk management practices are reviewed in commercial Banks, 6.6 percent (n =21) of the participants indicated that risk management practices in commercial Banks are never reviewed as well as 45.8 percent (n = 146) of the participants indicating that risk management practices are seldom reviewed. Adding, 22.3 percent (n =71) of the participants indicated that risk management practices in commercial banks are sometimes reviewed as compared to 12.5 percent (n = 40) of the participants who indicated that the practices are very often reviewed. Also, 12.9 percent (n = 41) indicated that risk management practices are always reviewed. From the results, it is clear the majority of participants never and seldom review risk management practices in commercial banks. This evidence implies that a review of credit risk management practices as a strategy for mitigating credit exposure associated with

agricultural lending has not been effective in commercial banks in Ghana. This is a bad sign that credit risk management practices are key in mitigating credit risk exposure and need to be reviewed on regular basis.

The flow of borrowers' businesses was tested on participants to indicate how often these businesses are regularly monitored. From the data gathered, 11.6 percent (n = 37) indicated that the flow of borrowers' business is never monitored whilst 46.1 percent (n = 147) of the participants indicated that borrowers' business is seldom monitored. By extension, 19.4 percent (n = 62) of the participants indicated that borrowers' business is sometimes monitored as compared to 12.2 percent (n = 39) participants who indicated that the business of borrowers is often monitored to minimize credit risk. Only 10.7 percent (n = 34) of the participants indicated that the flow of borrowers' business is always monitored. This implies that most credit officers in commercial banks never and seldom monitor the flow of borrowers' business in agricultural finance. Lack of monitoring on borrowers' businesses means that a big threat is created by commercial banks in Ghana for potential credit losses resulting from defaults. This is because the only substantive source of borrowers' repayment comes from their business income and needs to be monitored for continuity and performance.

Participants were again asked how often credit risk management guidelines are regularly communicated. Responses indicated that 3.1 percent (n = 10) of the participants attested that risk management guidelines are never communicated whilst 4.4 percent (n = 14) were of the view that risk management guidelines are seldom communicated. Also, 11.6 percent (n = 37) of the participants opined that credit risk management guidelines are sometimes communicated as compared to 34.8 percent (n = 111) of the participants who viewed that the guidelines are very often communicated. It was also indicated by 46.1 percent (n = 147) of the participants that risk management guidelines are always communicated. From this analysis, it means that the majority of credit officers in commercial banks viewed that risk management guidelines are very often and always communicated to minimize credit risk. This means that most credit officers have adequate information about credit risk management practices of commercial banks that can be utilized to mitigate credit risk exposure in agricultural finance.

Lastly, the study also sought to identify whether government or credit associations guarantee loans for agricultural purposes. It was indicated from the responses that 42.3 percent (n = 1350) of the participants viewed that loans are never guaranteed by either government or credit associates whilst 31.3 percent (n = 100) participants indicated that loans are seldom guaranteed. It was further indicated by 10.7 percent (n = 34) of the participants that loans are sometimes guaranteed whilst 10 percent (n = 32) participants attested that loans are very often guaranteed. This is followed by 5.6 percent (n = 18) who indicated that loans are always guaranteed. The results analysed above implied that the majority of credit officers in commercial banks have the view that loans are never and seldom guaranteed by government or credit associations in an attempt to minimize credit risk exposure when granting such loans to the agricultural sector. Loans that are not guaranteed are not secured unless they are backed by collateral.

Table 5.12: Results of the Effectiveness of Credit Risk Mitigation Strategies

Credit Risk Management Strategies	Never	Seldom	Sometimes	Very Often	Always
<i>Credit Officers regularly identify loan distress signals.</i>	13	26	22	91	167
<i>The loan granting process is regularly reviewed.</i>	6	12	32	110	159
<i>There is a regular review of loan portfolio quality.</i>	4	15	36	107	157
<i>Employees' credit skills are regularly reviewed.</i>	27	148	76	40	28
<i>The credit administration process is regularly reviewed.</i>	4	16	46	104	149
<i>Borrowers' credit reports are regularly reviewed.</i>	9	13	37	123	137
<i>Borrowers' performance profile is regularly reviewed.</i>	9	12	46	124	128
<i>All credit-related transactions are properly documented.</i>	6	4	21	120	168
<i>Collateralized transactions are regularly monitored.</i>	29	151	45	44	50
<i>Credit department checks that loans are repaid on time</i>	9	10	25	107	168
<i>The credit department identifies loans with potential weaknesses that can cause repayment problems</i>	9	15	27	121	147
<i>The overall quality of the loan portfolio is assessed on a timely basis</i>	9	14	35	127	134
<i>Credit Officers are regularly trained.</i>	28	154	70	32	35
<i>Risk management practices are regularly reviewed.</i>	21	146	71	40	41
<i>The flow of the borrower's business is regularly monitored.</i>	37	147	62	39	34
<i>Credit risk management guidelines are regularly communicated.</i>	10	14	37	111	147
<i>Loans are guaranteed by the Government or credit associations</i>	135	100	34	32	18

Source: Researcher's compilation (2021)

5.3.3.1 Testing for reliability and sampling adequacy, Credit Risk Mitigation Strategies

Kaiser-Meyer-Olkin (KMO) sampling adequacy and Bartlett's test of sphericity were performed to check for sampling adequacy. The KMO results showed 0.892 and a P-value of 0.000 is indicated in Table 5.13. Since the KMO test $0.892 > 0.6$, it means that the sample was adequate and valid. Since the KMO test is adequate, findings and

conclusions generated from the results of the questionnaire items on the effectiveness of credit risk mitigation strategies are reliable.

Table 5.13: KMO and Bartlett's Test on Effectiveness of Credit Risk Mitigation Strategies

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.892
Bartlett's Test of Sphericity	Approx. Chi-Square	2133.545
	Df	136
	Sig.	0.000

Source: Researcher's compilation (2021)

The Credit Risk Mitigation Strategies used by Ghanaian commercial Banks in agricultural finance were grouped into three components from the PCA. The variance of the three components accounted for 56.74 percent; P-value of 0.000 (Bartlett's test); KMO = 0.892 indicated in Table 5.13 and Cronbach's alpha ranged from 0.75 to 0.88 indicating the adequacy and reliability of the data gathered.

Table 5.14 Total Variance Analysis, Credit Risk Mitigation Strategies

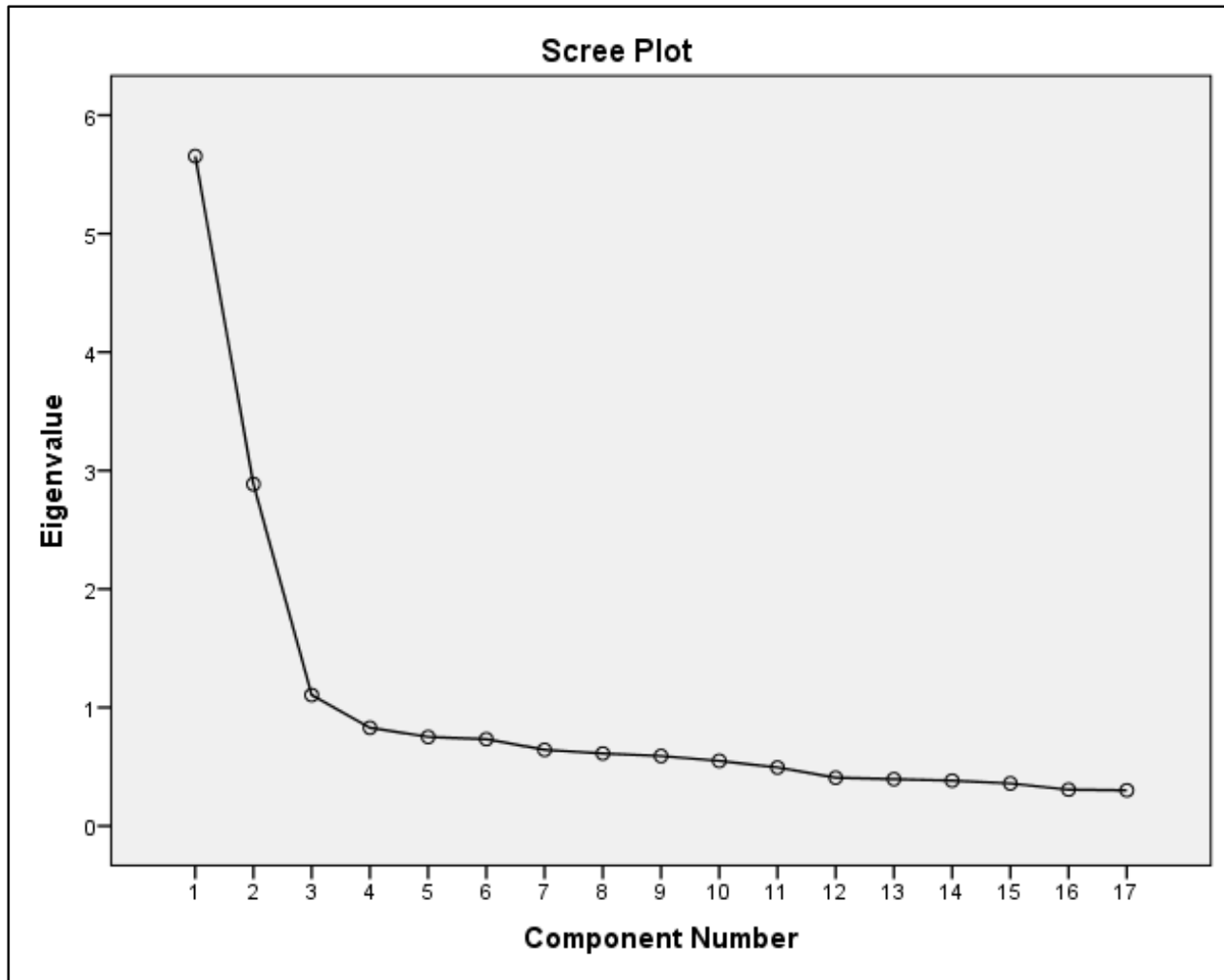
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.655	33.264	33.264	5.655	33.264	33.264	4.379	25.759	25.759
2	2.886	16.975	50.239	2.886	16.975	50.239	3.042	17.893	43.652
3	1.106	6.503	56.743	1.106	6.503	56.743	2.225	13.091	56.743
4	.829	4.875	61.617						
5	.752	4.421	66.038						
6	.733	4.310	70.349						
7	.643	3.780	74.129						
8	.612	3.600	77.729						
9	.591	3.474	81.203						
10	.549	3.232	84.435						
11	.494	2.905	87.340						
12	.407	2.395	89.735						
13	.395	2.325	92.060						
14	.383	2.253	94.313						
15	.359	2.114	96.427						
16	.306	1.802	98.229						
17	.301	1.771	100.000						

Extraction Method: Principal Component Analysis.

Source: Author’s estimates (2021)

In conjunction with the eigenvalue-one criteria, the proportion of variance accounted for and Scree Plot, three relevant components were retained as indicated in the previous section table 5.14. The Scree Plot in Figure 4, consists of a list number of components on the horizontal axis and a list of eigenvalues on the vertical axis. Components with Eigenvalues greater than 1 indicated on the plot in Figure 4 were retained. Components 1 to 3 produced eigenvalues greater than 1. Once the eigenvalues are greater than 1, these three components are regarded to be meaningful in order of importance depending on the eigenvalues and were retained for discussion. The components appearing after the break indicated in figure 4 were not considered to be significant.

Figure 4: Scree Plot of Components in Credit Risk Management Strategies



Source: Author's estimates (2021)

The correlation between the components extracted and the individual variables was reviewed. The review establishes the constructs measured by each of the three components. For easy interpretation and analysis, the components were rotated. The varimax rotation with the Kaiser Normalization approach was performed and results are displayed in Table 5.15.

Table 5.15 Component Transformation Matrix

Component	1	2	3
1	.840	-.240	.486
2	.184	.970	.161
3	.510	.046	-.859

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
Source: Author's estimates

The first components, named as Loan review and the documentation indicated in Table 5.16 indicating the most frequently used strategies adopted by commercial banks in agricultural finance to minimize credit risk consists of eight factors with an eigenvalue of 5.655, variance explained of 33.26 percent indicated in Table 5.16 and a Cronbach's alpha of 0.88. The factors identified included regular identification of loans with distressing signals with factor loads of 0.711, regular review of loan granting process with factor loads of 0.748, review of loan portfolio quality with factor loads of 0.779, regular review of credit administration process with factor loads of 0.697 and regular review of borrowers' credit reports with factor loads of 0.747. Others include regular review of borrowers' performance with factor loads of 0.714 proper documentation of all credit-related transactions with factor loads of 0.586 and assessment of the overall quality of loan portfolio on a timely basis with factor loads of 0.628.

The second component given a name as Credit skills reviewed and monitored comprises six factors with an eigenvalue of 2.886, variance explained of 16.98 shown in Table 5.16, and Cronbach's alpha of 0.80. The second most frequently used factors were identified as regular review of employees' credit skills with factor loadings of 0.725, regular monitoring of collateralized transactions with factor loadings of 0.620, and regular training of credit officers with factor loadings of 0.773. The rest include regular review of risk management practices with factor loadings of 0.781, regular monitoring of the flow of borrowers' business with loadings of 0.720, and loan guarantee by government or credit associations.

The third component identified as Credit Department Checks comprises of three factors with an Eigenvalue of 1.106, variance explained of 6.50 percent, and a Cronbach's alpha of 0.75. The factors identified include regular checks by the credit department for the

repayment of loans on time, which has factor loads 0.726, regular identification by the credit department for loans with potential credit weakness that can cause repayment problems (loads, 0.766), and regular communication of credit risk management guidelines with factor loads of 0.653.

Table 5.16: Factor Analysis on the Effectiveness of Credit Risk Mitigation Strategies

Factors	Loadings
Component 1: (Loan review and Documentations)	
<i>(Eigen values:5.655; Variance: 33.26%; Cronbach's alpha: 0.88)</i>	
<i>Credit officers regularly identify loan distress signals</i>	0.711
<i>The loan granting process is regularly reviewed</i>	0.748
<i>There is a regular review of loan portfolio quality</i>	0.779
<i>The credit administration process is regularly reviewed</i>	0.697
<i>Borrowers' credit report is regularly reviewed</i>	0.747
<i>Borrowers' performance profile is regularly reviewed</i>	0.714
<i>All credit-related transactions are properly documented.</i>	0.586
<i>The overall quality of the loan portfolio is assessed on a timely basis</i>	0.628
Component 2: (Credit Skills Review and Monitoring)	
<i>(Eigen values:2.886; Variance: 16.98%; Cronbach's alpha: 0.80)</i>	
<i>Employees' credit skills are regularly reviewed.</i>	0.725
<i>Collateralized transactions are regularly monitored</i>	0.620
<i>Credit Officers are regularly trained</i>	0.773
<i>Risk management practices are regularly reviewed</i>	0.781
<i>The flow of the borrowers' business is regularly monitored.</i>	0.720
<i>Loans are guaranteed by the Government or credit associations</i>	0.578
Component 3:(Credit Department Checks)	
<i>(Eigen values:1.106; Variance: 6.50%; Cronbach's alpha: 0.75)</i>	
<i>Credit department checks that loans are repaid on time</i>	0.726
<i>The credit department regularly identifies Loans with potential credit weaknesses that can cause repayment problems</i>	0.766
<i>Credit risk management guidelines are regularly communicated.</i>	0.653
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.892
Bartlett's Test of Sphericity(p-value)	2133.55(0.00)
Percentage of the total variance explained	56.74%

Source: Author's estimates (2021)

5.3.3.1 Explanation of PCA Extracted Components, Credit Risk Mitigation Strategies

In this section, three components were extracted using the PCA. The first component (Loan Review and Documentations), the component with the highest eigenvalue of 5.655, variance 33.26, and Cronbach's Alpha of 0.88 contains the factors most frequently used by commercial banks as most important in mitigating credit risk denoted in Table 5.16. The second component (Credit Skills, Review, and Monitoring) which represents the second most important component which contains the factors used in the credit risk mitigation process contains an eigenvalue of 2.886, Variance of 16.98, and Cronbach's Alpha results of 0.80 shown in Table 6.16. The last component extracted is Credit Department Checks. The third component is the least used by commercial banks in mitigating credit risk. It is again noted that the variables with Eigenvalues of less than 1 were not considered to be significant and were dropped.

5.4 Comparative Analysis of Credit Risk Management Practices in Agricultural Finance

The significance of comparing the differences across the banks is to check for consistency and whether or not specific variables influence the credit risk management practices among the banks. It is also an important attempt to identify significant differences in the bank's credit risk management practices associated with agricultural lending. The study further investigated significant differences that exist among selected commercial Banks in their credit risk management practices adopted to mitigate credit risk exposure in agricultural finance. For confidentiality on disclosure of information protection, the names of the four commercial banks were coded as Bank A, Bank B, Bank C, and Bank D. The results of the analysis of variance are presented in the following section.

5.4.1 Comparative Analysis of Credit Risk Identification Methods across the Banks

The study employed ANOVA and MANOVA to analyse the differences in credit risk identification methods among the various Banks' credit risk management practices and compare multivariate sample means. The components compared in the ANOVA include audit checks and credit rating; Reports and Z-score; Agency and consultative views; and analysis methods. These components were used because they were the ones extracted

by the PCA whose Eigenvalues were more than 1 and were retained. The results of the ANOVA test are presented in Table 5.17. Regarding the methods used to identify credit risk in agricultural finance, the null hypothesis is that, there is no difference in the mean score of items among commercial banks in agricultural finance. The alternative hypothesis is that there is a difference in the mean score of items among commercial banks in agricultural finance. For Audit checks, the p-value (sig.) of F-statistics is 0.224 (22.4%) which is greater than the conventional level of significance of 5 percent. Hence we accept the null hypothesis and conclude that there is no difference in Audit checks across the banks. For report and Z-score, the p-value of 0.000 is less than the 0.05 (5%), meaning that the null hypothesis of no difference in the means of the reports and Z-scores among the banks is rejected. Thus, reports and Z-scores differ across the 4 banks. Also, the results of agency and consultative views the p-value of F-statistics showed a p-value of 0.000 which is less than the 5 percent significant level. Therefore, the null hypothesis of no difference across banks A, B, C, and D is rejected. It means that agency and consultative views vary across the banks. The analysis method also produced $F = 1.730$ and $Sig. = 0.161$. The p-value of the F-distribution is less than the 5 percent significant level, meaning that the null hypothesis is rejected. By implication, the analysis method differs across all the four commercial banks. In the context of this study, the F-test determines whether the variations between the group means are larger than the variance of the observations within the group. From the results, the ratios are sufficiently large implying that all the means are not equal and this accounts for why the use of ANOVA and MANOVA is significant as indicated in Table 5.17.

Table 5.17: Differences between the Banks on Credit Risk Identification Methods

Components	Banks	N	Mean	Std. Dev.	Df	F	Sig.
<i>Audit checks and Credit Rating</i>	Bank B	81	16.15	2.14	(3,315)	3.239	0.0224
	Bank A	82	15.70	2.11			
	Bank D	77	15.80	2.83			
	Bank C	79	16.76	2.36			
<i>Reports and Z-Score</i>	Bank B	81	6.19	2.30	(3,315)	7.733	0.000
	Bank A	82	7.72	2.74			
	Bank D	77	6.41	2.34			
	Bank C	79	6.10	2.37			
<i>Agency and Consultative Views</i>	Bank B	81	5.81	1.55	(3,315)	11.836	0.000
	Bank A	82	7.09	1.71			
	Bank D	77	6.07	1.12			
	Bank C	79	6.24	1.32			
<i>Analysis Methods</i>	Bank B	81	4.81	1.45	(3,315)	1.730	0.161
	Bank A	82	5.19	1.47			
	Bank D	77	4.91	1.49			
	Bank C	79	5.25	1.45			

Source: Author's estimates (2021)

From the multiple comparisons of the MANOVA results displayed in Table 5.18, it was found that the average score of “Audit checks and Credit Rating” for Bank C ($M = 16.76; SD = 2.36$) was statistically higher than Bank A ($M = 15.70; SD = 2.11$) and Bank D ($M = 15.80; SD = 2.83$). The average Bank A scores of “Reports and Z-score” ($M = 7.72; SD = 2.74$) was significantly higher than Bank B ($M = 6.19; SD = 2.30$), Bank D ($M = 6.41; SD = 2.34$) and Bank C ($M = 6.10; SD = 2.37$). Also, the average score of Bank A on “Agency and Consultative views” ($M = 7.09; SD = 1.71$) was significantly higher than Bank B ($M = 5.81; SD = 1.55$), Bank D ($M = 6.07; SD = 1.12$) and Bank C ($M = 6.24; SD = 1.32$). The P-values are displayed along with the means and standard deviations. P-Value of 0.05 (Typically ≤ 0.05) is statistically significant (Rouder, Morey, Speckman, & Province, 2012) and in this section, an indication of stronger evidence that the null hypothesis of similar credit identification is rejected at the 5% level of significance and implying that credit risk identification methods in commercial banks are not bank-

specific. The results of the P-values in Table 5.18, suggest that there is a statistically significant difference in the methods used by commercial banks to identify credit risk in agricultural finance among the four banks in terms of “Audit checks and Credit Rating”, “Reports and Z-score” and “Agency and Consultative Views”. This indicates that most of the credit risk identification methods used by commercial banks are bank-specific. This is good for the banks considering that the nature of business operations and activities in these banks vary and different credit risk identification methods might be needed to identify credit risk associated with agricultural lending.

Table 5.18: Multiple Comparison

Banks	Audit checks and Reports and Z-score Credit Rating				Agency and Consultative View		
		Mean Diff.	p-value	Mean Diff.	p-value	Mean Diff.	p-value
<i>Bank B</i>	Bank A	0.45	0.230	-1.52*	0.000	-1.28*	0.000
	Bank D	0.35	0.350	-0.22	0.580	-0.26	0.260
	Bank C	-0.61	0.100	0.09	0.810	-0.43	0.060
<i>Bank A</i>	Bank B	-0.45	0.230	1.53*	0.000	1.28*	0.000
	Bank D	-0.1	0.800	1.31*	0.000	1.02*	0.000
	Bank C	-1.06*	0.000	1.62*	0.000	0.84*	0.000
<i>Bank D</i>	Bank B	-0.35	0.350	0.22	0.580	0.26	0.260
	Bank A	0.1	0.800	-1.31*	0.000	-1.02*	0.000
	Bank C	-0.96*	0.010	0.31	0.430	-0.17	0.450
<i>Bank C</i>	Bank B	0.61	0.100	-0.09	0.810	0.43	0.060
	Bank A	1.06*	0.000	-1.62*	0.000	-0.84*	0.000
	Bank D	0.96*	0.010	-0.31	0.430	0.17	0.450

Source: Author’s estimates (2021)

5.4.2 Comparative Analysis of the Effectiveness of the Implementation of Credit Risk Management Policies across the Banks

The study employed ANOVA and MANOVA to analyze the differences in implementation of credit risk management policies in agricultural finance among the selected Banks. The ANOVA results revealed that implementation of credit risk management policies in agricultural finance was significantly different among the banks. For “Compliance, insurance, and Creditworthiness”, the p-value of the F-statistics is 0.048 (4.8%) indicated in Table 5.19 less the 0.05 (5%) level of significance, meaning that the null hypothesis is rejected. It is therefore concluded that compliance, insurance, and creditworthiness differ across the 4 commercial banks in the implementation of their credit risk management policies. In contrast, restriction and history of borrowers showed ($F(3,15) = 0.657; P = 0.579$) for all the four commercial banks. With regards to restrictions and the history of borrowers, the p-value of the F-distribution is greater than the 5 percent level of significance, indicating that the null hypothesis of no significant difference mean score across the banks is true. The F-statistics in Table 5.19 is sufficiently large indicating that, there are no equal means and the reason for the use of ANOVA as indicated in Table 5.19.

Table 5.19: Differences Between the Banks on Implementation of Credit Risk Management Policies

	<i>Banks</i>	<i>N</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Df</i>	<i>F</i>	<i>Sig.</i>
<i>Compliance, insurance, and Creditworthiness</i>	Bank B	81	30.38	2.97	(3,315)	2.665	0.048
	Bank A	82	29.61	3.73			
	Bank D	77	29.38	4.37			
	Bank C	79	30.96	4.55			
<i>Restrictions and History of borrowers</i>	Bank B	81	13.37	2.91	(3,315)	0.657	0.579
	Bank A	82	13.82	2.49			
	Bank D	77	13.88	2.22			
	Bank C	79	13.74	2.28			

Source: Author’s estimates (2021)

From the multiple comparisons of the MANOVA results in Table 5.20, it was found that the average score of “compliance, insurance and creditworthiness” for Bank C Bank ($M = 30.38; SD = 2.97$), was statistically higher than Bank A ($M = 29.61; SD = 3.73$) and Bank D ($M = 29.38; SD = 4.37$). The results of the individual P-values in Table 5.20, point to the fact that there is a statistically significant difference in the effectiveness of the implementation of credit risk management policies of commercial banks in agricultural finance in terms of compliance, insurance, and credit worthiness policies. This implies, apart from restrictions and history of borrowers' policies, the effectiveness of the implementation of credit risk management policies is bank-specific. In summary, it can be seen that Bank A exhibits more effectiveness in the implementation of credit risk management policies than the rest of the commercial banks assessed in this study. In this study context, the remaining banks apart from Bank A have more room for improvement on the implementation of credit risk management policies in agricultural finance to minimize credit risk exposure.

Table 5.20: Multiple Comparison

Banks	Compliance, Insurance, and Creditworthiness		
		Mean Diff.	p-value
<i>BANK B</i>	Bank A	0.77	0.214
	Bank D	1.00	0.112
	Bank C	-0.58	0.352
<i>Bank A</i>	Bank B	-0.77	0.214
	Bank D	0.23	0.712
	Bank C	-1.35*	0.031
<i>Bank D</i>	Bank B	-1.00	0.112
	Bank A	-0.23	0.712
	Bank C	-1.58*	0.013
<i>Bank C</i>	Bank B	0.58	0.352
	Bank A	1.35*	0.031
	Bank D	1.58*	0.013

Source: Author’s estimates (2021)

5.4.3 Comparative Analysis of Credit Risk Mitigation Strategies across the Banks

This section discusses the comparative analysis of credit risk mitigation strategies across the 4 commercial banks using ANOVA and MANOVA. The results of the ANOVA are presented in Tables 5.21 and 5.22. For loan review and proper documentation, the p-value of the F-statistics indicated 0.097 (9.7%) which is greater than the 0.05 (5%) level of significance, meaning that the null hypothesis of no difference between the mean score of items is valid. We, therefore, accept the null hypothesis, meaning that loan review and proper documentation do not vary across banks. Regarding credit skills review and monitoring for the p-value of the F-test showed 0.001 (0.1%). The p-value of 0.001 (0.1%) is lower than the conventional significance level of 0.05 (5%) and hence the null hypothesis of no difference between the mean score of items is rejected and is concluded that credit skills review and monitoring differ across the 4 banks. It implies that there is a statistically significant difference in credit risk mitigation strategies among the banks in terms of credit skills review and monitoring. In addition, the p-values of F-statistics for credit department checks indicated 0.084 (8.4%) greater than the 5 percent level of significance. This implies that the null hypothesis of no difference in the mean score of items regarding credit department checks is true. It can therefore be concluded that we accept the null hypothesis. The solid implication is that credit department checks do not vary across banks. From these results, it is clear that variations are sufficiently large implying that all the means are not equal and affirms the significant levels of the ANOVA test indicated in Table 5.21.

Table 5.21: Differences Between the Banks on Credit Risk Mitigation Strategies

	<i>Banks</i>	<i>N</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Df</i>	<i>F</i>	<i>Sig.</i>
<i>Loan review and proper documentary</i>	Bank B	81	23.18	3.86	(3,315)	2.121	0.097
	Bank A	82	23.46	3.58			
	Bank D	77	23.12	3.99			
	Bank C	79	24.52	4.42			
<i>Credit reviewed and monitored</i>	Bank B	81	10.54	2.85	(3,315)	5.849	0.001
	Bank A	82	12.17	4.00			
	Bank D	77	11.16	3.33			
	Bank C	79	10.07	3.19			
<i>Credit department checks</i>	Bank B	81	8.97	1.48	(3,315)	2.237	0.084
	Bank A	82	9.26	1.21			
	Bank D	77	8.68	2.04			
	Bank C	79	9.30	1.96			

Source: Author's estimates (2021)

In the multiple comparisons of the MANOVA test in Table 5.22, the P-values are displayed along with the mean differences. As indicated in section 5.4.1, a P-Value of 0.05 (Typically ≤ 0.05) is statistically significant and an indication of stronger evidence that the null hypothesis of similar credit risk mitigation strategies is rejected at the 5% level of significance. The conclusion from this is that credit risk identification methods in commercial banks are not bank-specific but cut across all of the four that participated in this study.

These results of the P-values in Table 5.22 imply that there is a statistically significant difference in the methods used by commercial banks to identify credit risk in agricultural finance among the four banks in terms of Credit Skills, Review, and Monitoring. It means that credit risk mitigation strategies used by commercial banks to minimize credit risk in agricultural finance vary across banks. In summary, however, it is noted that Bank A exhibited more credit skills review and monitoring as strategies used to mitigate credit risks in agricultural finance and followed by Bank D. The variation in the credit risk mitigation strategies is significant for the banks in minimizing credit risk since these banks

have different sizes, different nature of credit risk exposure and different operational activities that will require different approaches to mitigating credit risk.

Table 5.22: Multiple Comparison

Banks	<i>Credit Skills Reviewed and Monitored</i>		
	Mean Diff.	P-Value	
<i>Bank B</i>	Bank A	-1.63*	0.002
	Bank D	-0.62	0.249
	Bank C	0.47	0.381
<i>Bank A</i>	Bank B	1.63*	0.002
	Bank D	1.01	0.060
	Bank C	2.10*	0.000
<i>Bank D</i>	Bank B	0.62	0.249
	Bank A	-1.01	0.060
	Bank C	1.09*	0.045
<i>Bank C</i>	Bank B	-0.47	0.381
	Bank A	-2.10*	0.000
	Bank D	-1.09*	0.045

Source: Author's estimates (2021)

5.4.4 Comment on Differences between the Banks

In summary, this section evaluates the differences among the four commercial banks in terms of their credit risk management practices. In evaluating the differences, the ANOVA and MANOVA tests were conducted. The results showed different F-statistics and P-values for the various components among and vary across banks. The F-statistics and P-values, therefore, indicated that the ratio of the variances for most of the components are significantly large and hence significant difference between the banks. With the evidence displayed in Tables 5.17, 5.18, 5.19, 5.20, 5.21, and 5.22, it was found that the credit risk management practices adopted by commercial banks which involve credit risk identification methods; effectiveness of the implementation of credit risk management policies; and effectiveness of credit risk mitigation strategies are bank-specific. It was also found that Bank A exhibit more credit risk management practices than the other commercial banks.

5.5 Analysis of Interview Results

The significance of supplementing quantitative analysis with qualitative analysis cannot be over-emphasized. First, it provided additional information that would probably have not been obtained through the questionnaire on the effects of credit risk management practices of commercial banks on agricultural lending. It also provided a more holistic understanding of credit risk management practices of commercial banks in agricultural lending to provide a comprehensive analysis of the research problem than either of the approaches. To probe participants for a detailed understanding of credit risk management practices in commercial banks, an in-depth interview was conducted to buttress the responses gathered through the questionnaires. The interview was purposely conducted for credit officers and managers who were involved in credit risk management and agricultural finance. The interview was voluntary and a participant could withdraw at any point in time. Out of the total participants of 12 who were targeted for the interview data collection through telephone conversation, 10 participants turned up resulting in a response rate of 83 percent. For confidentiality purposes, all the ten participants from the commercial banks who availed for the interview were given coded names namely A₁, A₂, and A₃, from Bank A; B₁, B₂, and B₃ from Bank B; C₁ and C₂ from Bank C as well as D₁ and D₂ from Bank D. The names of the interviewees were generated using the coded names¹⁸ of the banks which they represent. The subscript number represents the order in which the interview was conducted from each participant of the four commercial banks. For instance, A₁ represents the first participant from Bank A to participate in the interview data collection. The other participants follow the same approach. Also, for easy understanding and references, the interview results were reported bank by bank in line with the themes generated. Responses were grouped into five broad themes for analysis. These themes generated include the following:

- Factors considered by commercial banks in agricultural finance;
- Loan authorisation and approval process in agricultural finance;
- Challenges faced by commercial banks in agricultural finance;

¹⁸ Kindly refer to section 5.4 for coded names of the banks

- Experience and qualification requirements of credit officers; and,
- Best strategies that could be used by commercial banks to mitigate credit risk in agricultural finance.

It must be noted that the interview responses from participants were modified to update the grammatical errors and wrong construction of sentences. However, the modification did not affect the gist of the statements uttered and therefore the results retain the spirit of the conversations from which specific conclusions are drawn. The themes generated were discussed in line with the objectives to which they relate and conclusions are drawn.

5.5.1 Factors Considered by Commercial Banks in Agricultural Finance

Certain factors are considered by banks before approval and extension of credit to customers. Such factors could be an eye-opener to the bankers as to the potential risk inherent in the venture financed by the credit. This interview in this section is relevant for risk identification in agricultural finance, which is the first objective of this study. Participants were asked to indicate some of the factors and conditions considered by commercial banks in agricultural finance. Evidence from the participants denotes that, several factors are considered before granting loans to borrowers. Whilst most of the factors considered by banks were common across all the banks, some few were bank-specific.

From Bank A regarding the factors considered by commercial banks in agricultural finance, it was indicated that the bank confirms whether the loan request is really for agricultural purposes. In furtherance, it was indicated that, because agricultural finance is a high-risk area, Bank A investigates the areas they want to invest the financial resources. Further, Bank A investigates and confirms whether the borrower is into crop farming, livestock, agro-business, or any of the agricultural value chain activities. It was verified in Bank A that the investigation of the area of the project being financed helps determine whether the business is legal and acceptable. It was also cited that commercial banks must investigate the purpose for which the credit is requested before releasing credits to borrowers in the agricultural sector. Also, Bank A considers the expertise of credit officers but does not consider the technical background of the officers before granting loans for agricultural purposes. Interview results indicated that commercial banks

should consider the reasonableness of the amount requested by borrowers in the agricultural value chain. Another participant added that the reasonableness of the amount requested informs commercial banks on the level of credit risk exposure and means to avoid or manage such risk. On the credit history of the borrower, the experience of the borrower in previous credit facilities from the bank, and whether the management of the borrowing company can repay loans are considered critical factors in '*Knowing Your Customers*'. A participant indicated the following vignette:

'We even take the qualification of the management. Do they have what it takes to run the kind of business they are talking about?'

This means that Bank A considers the competencies of the management of agribusinesses before granting loans to be assured that advances are in safe hands. Another participant confirms that the quality and character of the management and promoters are very crucial to determine whether people have technical knowledge in the fields that they are venturing into and whether there is a succession plan. In this context, a participant submitted the following verbatim:

'...somebody may have defaulted all over the places as a serial defaulter. ...if we know such a person is the lead promoter, definitely we need to think twice before we advance anything because he's likely to repeat the same...'

This implies that Bank A takes necessary steps to gather and know more information about the agricultural borrowers before granting loans for agricultural purposes. Security requirement was also one of the factors considered in granting loans for agricultural purposes. It was further stated that loans that are not supported by collaterals are risky and commercial banks are likely to suffer losses should borrowers default in repayment. A participant during a probe submitted the following:

'...there are rules around the securities. So... Bank of Ghana says that you have to give a security cover of 120%'

The statement clearly shows that bank A prefers agricultural borrowers to back their loans with reliable securities to hedge against loan losses. Other areas considered by the commercial banks before granting credits are the location, financial performance of the

agricultural borrowers' businesses, how long the business has been in existence, whether the business has an already market, the efficiency of the borrowers' agribusiness, and prudential requirement from the Central Bank. As established through the in-depth interview, the financial analysis would include turnover, liquidity analysis, credit capacity, and sustainability of the business to repay the facility without problems. The cash flow of borrowers was also identified as a factor assessed before granting credit. Interview results from Bank A further indicated that, because agricultural finance is very risky, loans are mostly given to salary workers. The implication is that there is not much focus on the agricultural sector. It was further stated that salary workers receive regular inflow and the probability of default is very low and hence less risky compared to the agricultural sector.

In Bank B, most of the factors identified in agricultural finance are similar to those identified by Bank A. A participant in bank B indicated that agricultural credit is appraised using basic pointers like the purpose of the loan and business cycles such as weather conditions if it involves crop farming. The participant further explained in the following verbatim words:

'...so, assuming somebody comes to you, he wants to farm maize in the dry season. Is it possible? What has he put in place to assure that he can farm maize?'

It implies that the timing of loan requests by agricultural borrowers is relevant in advancing loans. It was also found from Bank B that, the equity contribution of borrowers and the technical analysis of the agricultural projects undertaken by borrowers are also factors considered in agricultural finance. From a participant in Bank B, the technical analysis includes the examination of the raw material base, the location of the project, and so on. Participants also considered climate as a critical factor. In crop farming, commercial banks also consider the location of the land. It was further stated that,

'...sometimes it may become necessary to do a soil test if it is for production of a particular crop whether it does well in that location.'

For farming purposes, the implication is that the location in which the land is situated must be considered before granting loans. This confirms whether a particular land is good for a specific or special product to minimize losses. Bank B also showed that the equipment used for production is examined to confirm if they meet the state of the art that can

produce standard goods to meet quality. Additionally, it was also indicated that commercial banks consider how competitive a borrower is in the agricultural sector business before granting loans. As indicated by participants, commercial banks most often take into consideration the cost of operations when taking finance decisions on the agricultural sector. The cost of operations helps to determine if the business is viable and sustainable. Similar to Bank A, the analysis stated by a participant in bank B involves an examination of the income and Cashflow of agribusiness to be assured of future repayments of loans. It was further confirmed that, for small-scale agricultural borrowers who do not have collateral, commercial banks could only lend to them if only they belong to an association and which can provide a guarantee. As a participant puts it in the following words:

'...sometimes, you look at where the person is coming from. If he has an association, that is credible and the association can also guarantee for the person the bank will be okay to go ahead and finance the customer.'

This means bank B does not lend to small-scale agribusinesses unless that agribusiness belongs to an association and that the association can provide a guarantee against loan losses. This implies that any small agribusiness that does not have an association ready to provide a guarantee is denied access to agricultural loans regardless of the special nature of the project in question. The interview results from Bank C and Bank D are not too different from the results obtained from Bank A and bank B as already reported. The results from Bank C and Bank D showed that management qualities, collateral facility, the experience of credit officers, and Cashflow of agricultural borrowers are some of the major factors considered in agricultural finance. Others include the credit history of the borrower, the size of the loan, borrowers' capital, and the type of agribusiness undertaken by specific agricultural borrowers.

In conclusion, some of the key factors mentioned by the bankers as aspects considered by the four commercial banks in agricultural finance include management capabilities, the experience of agricultural borrowers, the expertise of credit officers, the nature of agribusiness, knowing your customer assessment, collateral, credit guarantee, credit history, cashflow and the size of the loan. Others include the location of agribusiness,

cost of operation, purpose of the loans, climate, and whether the agribusiness has an already existing market. Also, loans are granted to agricultural borrowers who are salaried workers regardless of the special nature of agricultural finance where special attention and priority needs to be placed.

5.5.2 Loan Authorisation and Approval Process in Commercial Banks

While the interview in 6.5.1 is relevant for credit risk identification in agricultural finance which is the first objective of this study, the interview results in 6.5.2 may be relevant for the effectiveness of the implementation of credit risk management policies which is the second objective. The interview results revealed that loan authorization and approval processes in agricultural finance are almost the same in all the commercial banks. From the interview results, participants from all the Banks A, B, C, and D indicated that whenever a borrower approaches the bank with an application for agricultural credit; there is a business unit in commercial banks that put together what is termed a credit paper. The Relationship Manager or the Relationship Officers provide the customer with a checklist of the requirements to process the application.

The relationship managers first interview the borrower to get more information on the cashflow, business plan, and products. Then the next stage is to pay a working visit to the agribusiness location to verify what is on the ground. Once the relationship officer is satisfied with the information on the ground, a credit paper is generated. From an interviewee, a credit paper is essentially a document that contains all credit information of borrowers. It includes the borrowers' credit history, cashflow, location, security, amount of loan requested, the purpose of the loan, interest charged, and repayment period reported in 6.5.1. The credit paper is forwarded to the risk department for full examination and recommendations. Apart from Bank B and Bank C that have agribusiness Units dealing with agricultural-related credits, Bank A and Bank D do not have such Units. It was further indicated that the risk department would then assess the loan request and make recommendations to the Credit Committee or the Managing Director or the Board based on the authorised limit for approval. The information is communicated back to the application station and then the agricultural borrower is informed of the outcomes. If the request is approved, the borrower is required to fulfill all pre-disbursement conditions before the loan is finally disbursed.

The interview results indicated that loan authorisation and approval processes in agricultural finance are common among Bank A, Bank B, Bank C and Bank D. From the results, loan approval and authorisation processes in commercial banks involves application from the agricultural borrower; generation of a credit paper; provision of the checklist by the commercial banks to the agricultural borrowers; preliminary interview of the agricultural borrower to get more information on the cashflow, business plan, and products and paying a working visit to the agribusiness location or the project site to see what is on the ground. A recommendation is then made to the credit committee or Managing Director or the Board for consideration. Agricultural borrowers are required to fill pre-disbursement conditions before loans are disbursed. The interview confirmed that there are no special authorisation and approval processes for agricultural loans considering that agricultural finance is a special area that needs special attention. Also, not all commercial banks have agribusiness units that deal with agricultural-related loans.

5.5.3 The Challenges Encountered by Commercial Banks in Agricultural Finance

Another theme that was discussed by participants is the challenges encountered in agricultural finance in commercial banks. This section is relevant to supplement the results in section 6.5.2 for achieving objective two which is the effectiveness of the implementation of credit risk management policies of commercial banks in agricultural finance. In Bank A, it was indicated by one of the participants that there are not many implementation challenges because all policies are frequently followed and implemented. Contrary another participant in Bank A revealed that there are numerous challenges in agricultural finance because the sector is very risky. It was revealed by participants in bank A that some of the commercial banks do not have dedicated units or officers that purposely handle agricultural finance. Another participant indicated that, even though agricultural finance is a specialised area, no specific or specialised unit has been set up to handles loans that are granted to the sector. It was further cited that, there is not much attention given to the agricultural sector as far as finance is concerned in spite of the importance of the sector and its associated high risk. No special regulations govern the sector as confirmed in the policy review reported in Chapter 5. It was also attested that poor yield is one of the most challenging factors encountered in agricultural finance. Poor yield results in agricultural borrowers' businesses lead to the poor performance of loans

leading to repayment problems. One of the participants indicated that there are instances where farms were granted loans and

'...all of a sudden all the birds died' and 'where there was an issue with tilapia being poisoned'.

This implies that where poor yield is recorded, productivity reduces and affects the cashflow of agribusinesses thereby create an inconvenient situation to repay loans with interest. It was also indicated by a participant in Bank A that, it is usually very difficult and stressful to get approval for loans meant for agricultural purposes as a result of the risky nature of agribusiness. Following, another participant indicated that, there were a few instances where people tried to get credit officers to go against the credit policies. However, it was the duty of the credit officers to ensure that even if it is an exceptional case, it was properly approved. A participant also added that commercial banks are very reluctant in giving loans to farmers, as the recovery of loans is strictly difficult in Bank A. The delays in getting the approvals ready are a major challenge because either borrowers are not able to put the documentation together on time or do not have them at all. In situations where the documents are not available, it means the borrowers do not have the financials. This further puts credit officers into a difficult position as they have to visit borrowers' businesses for instance farms at the field as the only basis for the drafting of the credit paper for approval. A participant state,

'...assuming a farmer without proper documentation is applying for a loan in the dry season, you go and there's nothing on the field. How would you be able to tell whether this farmer is really into farming?'

It implies that the poor record-keeping habit of the agriculturists is a major challenge in providing commercial banks the necessary documentation required for loan approval. Explaining further, it was stated that,

'...You know, the farmers usually don't keep books or good records on their operations'.

This implies that most agricultural borrowers do not keep proper accounting records and documentation. This makes it difficult for such borrowers to use their records as a basis

for accessing loans from commercial banks. It was further stressed by another participant in the following words:

'...for some of these businesses or farmers that apply or in the agribusiness, they don't have information. It will surprise you to know that some people do not even cost how much they spend in producing one acre of maize for example. ...So there is that information lack in the system... so lack of information of the credit. And also you don't know whether the person has taken a loan from bank A or B because...it's doesn't show anywhere. They don't have the financials that all these things will be recorded. Some of them may not even have any petty cash book or anything thing to keep records'

This implies that, because of the lack of adequate records and documentation kept by agricultural borrowers, commercial banks are unable to get all information required for loan approval. It means information such as income generation, cash flow, commitments of agriculturists, and cost of production may not be available for the banks to make needed assessments for loan advancement. One of the participants bemoaned that, even though Ghana Incentive-Based Risk-Sharing System for Agricultural Lending Projects (GIRSAL)¹⁹ provides credit grantees for the agricultural value chain,

'...I don't think all of them are aware'

This implies that most agriculturalists do not know about the existence of GIRSAL which provides a guarantee to access agricultural loans. Similarly, the inability of borrowers to provide adequate structured capital or collateral is another major challenge identified. It was stated that there are farmers or poultry farmers or agro-business persons who want the loan but do not have the structured capital or collateral to secure the loans. Besides, most of the borrowers such as farmers do not even have proper documentation on their farmlands. In such instances, it is difficult for them to use such land as collateral security to secure loans for agricultural purposes. One of the biggest challenges also identified

¹⁹ GIRSAL is a project aims to enhance agricultural finance and sector transformation through increase capital inflows into critical value chains in Ghana. The participant also indicated that, banks should consider spreading their portfolios in order to mitigate credit risk.

during probing is the lack of a ready market. Results showed rainfall may fail farmers, thereby making the recovery of loans difficult. Even farmers might have a bumper harvest but might not have a market to sell their produce to repay their loans and these loans will grow bad affecting the performance of commercial banks. To ascertain what makes recovery of loans difficult when there is no ready market, one of the participants indicated that,

'...you know when we give the loans the farmer will have to go and invest into the farming. And then when he gets the yield, he will sell it and payback, and from where we come...if you are not lucky and the rain doesn't come, you don't get anything.... We don't have an available market. Just imagine someone taking a loan to go and farm or ...grow crops and tomatoes. These products are highly perishable. So the moment you finish and you don't get ready market you are not able to preserve them anyway. So even the capital that you are going to even recoup, that one alone you are not able to get. So, we should give you so much to invest in and how are we going to recover them?'

In Bank B, the results of the interview are not too different from that of Bank A. One participant in Bank B established that crop production in Ghana is seasonal and borrowers specialising in crop farming might not have inflows for some particular seasons to repay their loans. The crop produces cannot afford irrigation facilities and only rely on the rain. The participant again specified that the diversion of funds or capital is a cause for major implementation challenges in agricultural finance for Bank B. Results from the interview showed that some of the agricultural borrowers divert the loans as soon as they are disbursed. Results from Bank B additionally confirmed that some agricultural borrowers seek to avoid the credit officers and this makes it difficult for loan managers who do onsite visits to ensure the loan is used for the purpose for which it was granted. This poses implementation challenges in commercial banks as monitoring is usually not effective. As a result,

'...it is difficult to tell whether the borrower is facing challenges or whether the farm is doing so well.'

It implies that, because monitoring in the bank is not very effective, credit officers find it difficult to establish and examine the challenges faced by agricultural borrowers and to evaluate the performance of loans granted to such borrowers. Further, the participant verified that there is a high monitoring cost in agricultural finance. It was noted it becomes difficult for commercial banks to get representatives that will monitor the performance of borrowers especially farmers in most rural areas due to the widely scattered nature of the regions and villages in Ghana. A participant stated that,

'...you don't have an RM (referring to Relationship Manager) there, how do you monitor what they are doing? Because, as Risk Managers, you can't afford to have them in all the branches. It's expensive'

It implies that an attempt to get risk officers in all the branches to monitor borrowers for repayment of loans would be very expensive and less prudent. Additionally, participants pointed out the lack of long-term funding for the agricultural sector as another challenge. Ensuing, it was found that there is no adequate agricultural infrastructure such as irrigation processes, storage facilities, and processing facilities. According to another participant in Bank B, the inadequacy of agricultural infrastructure always results in losses to particularly farmers that will ultimately affect the repayment of loans. One of the major challenges also pointed out in Bank B through the interview is the fact that the credit reference bureau can only give information up to the credit history but what is happening to a particular borrower in terms of financials is not known to commercial banks. It was further indicated that most of the farmers are not registered and do not have proper identity or information with the credit reference bureaus in Ghana. As one of the participants explained,

'...it becomes difficult for their data to be captured in the credit reference bureau but if it is a commercial farmer that has proper identity you know that you can check that they have information on the date of birth, where they were born...'

It means because most agricultural borrowers are neither nor captured with the credit referencing bureaus in Ghana, information on such borrowers is difficult to obtain for assessment in agricultural finance. Import subsidy was also identified as a major challenge facing Bank B. It was indicated that the importation of cheaper agricultural

produce is making the local production of Agricultural produces unattractive. For instance, if farmers can produce adequate chicken which is affordable, then people will rather prefer the broiler that is produced locally, which is cheap than the one that has been imported. Participants in Bank B also identified the underdeveloped nature of the export market as a challenge in agricultural finance. As indicated by one of the participants in Bank B, most of the borrowers just produce for local consumption. It was stated that borrowers' in the agricultural value chain would generate more income and improve their cash flow if they can export to the international markets. It further indicated however that, borrowers are not able to meet export orders because of either lack of capacity or less standard goods making it difficult to generate adequate foreign exchange to service their loans. This makes it difficult to recover loans from such customers.

In Bank C, some of the interview results reported are similar to those reported by Bank A and Bank B. In an instance, a participant in Bank C reported that exchange rate fluctuation is a major challenge as it affects material supplies such as the importation of fertilizer which eventually increases the cost of production and makes the local goods less competitive. There was also an indication that getting borrowers who meet all the requirements for an agricultural credit facility is a steep challenge. Getting approval for such a request is most stressful. The warehousing problem is another challenge that was identified in Bank C. Participants indicated that most farmers in rural areas do not have adequate storage facilities for their produce after a bumper harvest. This leaves them at the mercy of an already flooded market. The result is that goods are then subsequently sold at very cheap prices which are far below the cost of capital incurred to produce such goods and therefore initiate repayment problems.

In Bank D, some of the interview results reported are not too different from same mentioned by participants in Bank A, Bank B, and bank C. In addition, one of the challenges reported by participants in Bank D regarding the effectiveness of the implementation of credit risk management policies in commercial banks in agricultural finance relates to export finance where remittances of export proceeds delay and mostly lead to accumulated interest. As confirmed by a participant,

'...So, you realize that, by the time the money even comes, the customer will not even get anything because you use all the money to pay the interest, the profit that he is supposed to get on it because of the delays.'

It implies that the delays in export proceeds make it difficult for the agriculturist to pay off loans granted as a result of the fact that interest accumulates with time. The absence of letters of credit was also pointed as one of the challenges in agricultural finance. The in-depth interview results also found in bank D indicated that there is no insurance scheme in the agricultural sector, unlike the other sectors. A participant indicated that even though customers can ensure their goods in trading and vehicles in transportation, *there* is no insurance scheme in the agricultural market. Subsequently, results specified that office premises in the farmhouses are insured but the animals, farms and the produces are not insured. As confirmed by a participant in Bank D, the lack of insurance of agricultural products makes it very difficult to confidently finance agriculture, as the risk involved is very high. It was further revealed that, even though commercial banks consider experience and training on the job, the field of study is not considered in the appointment of credit officers. Commercial banks can engage people as credit officers with backgrounds in Sociology, Science, Accounting, Psychology, or Finance. The challenge with these different backgrounds is that, unlike the students in agriculture who already have the knowledge tree on agriculture, most of the credit officers do not have agricultural training background and are now going to learn from the customers or through google.

The challenges enumerated by participants from the four banks Bank A, Bank B, bank C and bank D as factors affecting the effectiveness of the implementation of credit risk management policies of commercial banks in Ghana are numerous. In summary, the challenges include lack of attention on agricultural finance; no specialized Units in charge of agricultural finance in some commercial banks; poor yield resulting in cash flow problems; poor documentation and lack of collateral facilities to secure loans. Others included lack of knowledge among agriculturists in risk and incentive-based schemes such as the GIRSA; lack of ready market; lack of storage facilities; seasonal variations, lack of agricultural infrastructure such as irrigation facilities; diversion of loans by agricultural borrowers after disbursement; monitoring problems and difficulty in the monitoring of credit officers in rural areas. In addition, most agricultural borrowers are not

registered with credit bureau organizations and no proper identification of such borrowers can be obtained. This confirmed the findings of Kusi et al. (2016) who indicated that the address system of Ghana is not robust to capture all information about borrowers. Import subsidy, underdeveloped export market, and difficulty in getting agricultural borrowers with all the requirements are some other challenges revealed. Moreover, lack of insurance schemes for agricultural products and lack of agriculturists with a technical background to specially manage agricultural finance and its associated risk were also reported. These findings complement the quantitative results discussed in section 5.3.2 which indicated that commercial banks most frequently used insurance schemes to mitigate against credit risk exposure in agricultural lending. Even though Odonkor (2018) in a study on Adansi rural banks in Ghana used descriptive statistics and found that insurance schemes helped banks to reduce credit losses, the interview results indicated that agricultural products have no insurance schemes in Ghana. This does not favour the farmers since any risk associated with production cannot be transferred to third parties to reduce credit risk. The findings of Dlugosch et al. (2018) in their assessment of a personality-based selection of entrepreneurial borrowers in Kenya using descriptive statistics is not different from Odonkor (2018).

5.5.4 Experience and Qualification Requirements of Credit Officers

The study also explored whether commercial banks have the right human capital responsible for the effective implementation of credit risk management policies and adopting the best strategies to mitigate credit risk exposure of commercial banks in agricultural finance. The easement for the right human capital of commercial banks was conducted to provide additional information for the achievement of objective two which involves the evaluation of the effectiveness of the implementation of credit risk management policies and objective three which involves the evaluate the effectiveness of credit risk mitigation strategies in agricultural finance. Generally, interview results from participants of the four commercial banks revealed that commercial banks consider experience and qualification in the appointment of credit officers. For instance, a participant in Bank A indicated that,

'...anybody who is a credit officer in this bank would have gone through the strongest interview' to be appointed as a credit officer.

This implies that credit officers are appointed after passing through thorough interviews to select the best human capital capable of managing credit risk and minimizing credit losses. Another participant in Bank B posited that,

'... making that business means bringing profit, so if you appoint a credit officer who is not experienced, then he gives loans and is not able to recover them. ... Or is not able to appraise the customer very well then he gives bad loans, then your bank is likely to collapse and it is going to affect your bank entirely, so we look at experience pure and understanding of the job before we appoint credit officers'

It implies that Bank B considers experience as a necessary tool for appraising agricultural borrowers and minimizing credit losses. The interview results in Bank C also indicated that the experience of credit officers is required to restructure loans granted to the agricultural sector to minimize credit risk. A participant in Bank C stated that,

'... If I don't have the experience, I wouldn't know how to structure an agricultural paper. I wouldn't know palm (referring to a tree crop) takes this number of years to start uprooting. So let's say I give an oil farmer a loan and I asked him to pay me monthly, how can he pay?'

It implies that, without experience, it is practically difficult for credit officers to restructure agricultural loans granted to borrowers. In Support, a participant in Bank D stated that,

'...If you are not fit for the purpose we don't even mind you. We don't even consider you to be fine. We normally train people on the job. We train people on the job but when it has to do with a critical position fit for the purpose..., the criteria is not about somebody bringing you in from whatever political position whatever, we don't do that. If you are fit for the position that is when you are qualified for it'

The implication is that, if one does not have experience, he is not considered fit to work as a credit officer. It also implies that training on the job is necessary for developing the experience of loan officers who can manage credits advanced to agricultural borrowers and minimize losses. Adding, it was also found that,

'When we see or when the team see that you are more than capable of doing the job and you don't have the academic qualification we train you on the job'

this means that people without any qualification who are capable of working as credit officers are appointed and trained on the job to manage credit-related transactions associated with agricultural finance. It also means that academic qualification is not a priority in the appointment of credit officers.

This section aims to assess whether commercial banks have the qualified human capital as a means to provide additional information for the achievement of objectives two and three indicated in section 5.5.4. In summary, experience and training on the job were found to be relevant in the assessment of agricultural borrowers as reported by all the banks; Bank A, Bank B, Bank C, and Bank D to minimize credit risk exposure in agricultural finance. It was also noted that people without academic qualifications are sometimes trained on the job to handle credit-related transactions. It is noted from the interview results that, all the four banks give more priority to experience and training on the job. This finding conforms to Harelimana (2017) evaluated the impact of risk management on Tanzanian banks and found that that regular training is given to credit officers to develop professionally and deliver quality service to reduce credit risk exposure. Little attention was placed on setting up technical units and appointment of credit officers with a technical background to handle credit-related transactions even though, agricultural finance is a special area and needs competent credit officers with technical backgrounds. This implies that some Ghanaian commercial banks will continue to face credit risk management challenges if attention is not a focused establishment of technical units and the appointment of personnel with an agricultural or technical background to administer and manage agricultural credits. It further implies that Ghanaian commercial banks do not consider the qualification of credit officers before making appointments. This is not good for the banks because training on the job alone is not adequate since commercial banks do not always prefer it as the first option strategy adopted to mitigate credit risk revealed by the quantitative analysis. See Table 5.16 in the research findings for a summary of the results. This finding provided additional information on the establishment of technical units which is missing in the questionnaire data. This makes the qualitative analysis very useful in evaluating the experience and qualification of credit officers.

5.5.5 Best Strategies to Mitigate Credit Risk in Agricultural Finance

Objective three aims at the best possible strategies that can be used by commercial banks to mitigate credit risk effects in agricultural finance. Participants suggested some strategies that can be used by commercial banks to minimize credit risk in agricultural finance. Results from the interview data suggested that the strategies that can be used to mitigate credit risk exposure in agricultural lending are bank-specific. In Bank A, a participant portrayed that, the agricultural sector generally has a high risk and making most banks relax in finance the sector's activities. It was posited that commercial banks can minimize credit risk in agricultural lending by collaborating with incentive-based risk-sharing systems such as the Ghana Incentive-Based Risk-Sharing System for Agricultural Lending Projects (GIRSAL) to encourage banks to lend more to the agricultural sector. It was explained that a bank can give loans to customers and goes through the process and is given a 70 percent guarantee cover by the GIRSAL to minimize credit risk. Doing so, the government pays for the loan if the borrower defaults. The loan guarantee project aims to enhance agricultural finance and sector transformation through increase capital inflows. In Bank A, a participant again recommended the government to intervene in the provision of inputs to farmers, subsidizing of loans for players in the agricultural value chain, and the recruitment of graduates who studied agricultural in all tertiary institutions. Likewise, the recruitment of graduates from agricultural training institutions for all-district by the government would enable players in the agricultural value chain to get regular technical and expert advice to mitigate credit risk exposure of commercial banks. For example, a participant indicated that,

'...So, if the government's intervention in agriculture is high, it brings the number of challenges down'.

Implying, the role of government cannot be overemphasized in ameliorating the challenges in agricultural finance. It was further indicated that commercial banks should set up units purposely in charge of agricultural finance and these units should be managed by technical people who have an agricultural training background. Similarly, one of the interviewees in Bank B asserted that commercial banks must have technical units that oversee and manage credit risk to minimize credit losses. It was found stating that,

'...Commercial banks should either have technical units or have an outsourced technical unit or standby that assist farmers who take facilities from them'.

Technical Units are required in commercial banks to completely eradicate the challenges of credit risk management associated with agricultural finance. It was further added that,

... 'this technical unit will pay regular visits to the farms of these customers and ensure that they are operating well within whatever confined level they find themselves. I think that if we have a technical unit or we have outsourced the technical unit that does close monitoring and assists and provides technical assistance to the farmers'.

Tacitly, the technical units are better in a position to closely monitor and provide assistance to agricultural borrowers to minimize credit risk exposure in agricultural finance. A participant in Bank B interpreted technical unit to mean, a unit that contains a group of people with a pure agricultural background and adequate knowledge who can direct and provide technical advice to commercial banks on agricultural lending and borrowers' agri-business management. It was also suggested in Bank B that commercial banks should collaborate with international bodies to identify and access a cheaper and long-term source of funding to finance agribusiness. In another instance in Bank B, it was elucidated that commercial banks can collaborate with funding bodies such as the Ghana Exim Bank, African Development Bank, Agencé Française de Développement, and then Outgrower and Value Chain Fund (OVCF). These to the participants are some of the funding partners that can help commercial banks to get cheaper funding from agencies such as the World Bank for agricultural purposes to mitigate credit risk exposure.

In Bank C, it was disclosed by a participant through the interview that borrowers should have a loan recovery account, where inflows from their businesses are deposited on a daily and weekly basis and linked to the main accounts with the commercial banks. As was stated by a participant;

, .. if there is The likelihood that, one of the months you may not get the money then we transfer the money from your loan recovery account to your main account to pay that particular months' loan off. So then, you will not default for that particular month'.

The loan recovery account according to one of the interviewees in Bank C is an account where daily sales are deposited with the banks. In defaults, commercial banks fall on the recovering accounts and transfer funds to the loan accounts to defray loan obligations. It was again submitted in Bank C that loans for agricultural purposes should be structured and released in tranches depending on how well the borrower is doing with regards to implementation or the entire usage of the loan. Subsequently, agricultural commercial banks can make use of the Ghana Agricultural Insurance Pool which provides insurance against possible losses on loans. The fund requires the funding of group projects. This funding source is better because a commercial bank that cannot meet long-term financial needs would not be contemplating locking up funds for agricultural long-term projects such as rubber for 5 to 10 years. A value chain finance approach was also suggested in Bank C in the agricultural sector to minimize credit risk exposure. It means that commercial banks should finance borrowers involved in the agricultural sector. For instance, in crop farming, the bank should consider finance from inputs to production, or storage, marketing, and finally to sales. This was backed with the idea that, if commercial banks finance agriculture by providing financial resources for raw materials and production and the products do not have ready markets, it will be difficult for borrowers to repay the loans. A participant stated that,

'...look at the key players within a certain value chain so that if you finance rice growers, then you look at the chain in totality. ...If not then you the bank, what you are doing now is, you try to link this farmer; you are financing a rice mill or an off-taker. We also will want him to have a certified seed so that the quality of the output will meet the standard. So, we also will link him to, an input dealer for example. ...So we don't have a situation where you lend and the project is successful but because of lack of marketing the farmer is unable to pay back the loans'

It denotes that commercial banks must be involved in value chain finance by proving already market for agricultural borrowers to generate more income and minimize credit losses. To minimize credit risk exposure in agricultural finance, it was suggested by participants that, commercial banks should invest more time in knowing their customers (KYC) before granting loans for agricultural purposes.

In Bank D a participant suggested that borrowers should be regularly monitored by experienced credit officers to recover loans from going bad. Again, it was also proposed by another participant in Bank D that commercial banks should assist or encourage borrowers in the agricultural sector to collaborate with off-takers to secure the already market to minimize credit risk exposure. It implies for instance that, if *'Guinness Ghana Limited has been an off-taker, it means that your product will go directly to them'* at a price agreed as per the terms indicated in the agreement between the two parties. As advocated, agricultural sector finance needs regular monitoring and supervision to minimize credit losses resulting from bad loans. It was also suggested that instead of using open accounts, which is riskier commercial banks, should encourage their borrowers to establish Letters of credit when dealing with export products.

Some of the interview results reported on credit risk mitigation strategies are bank-specific. In summary key credit risk mitigation strategies discovered during the interviews include collaboration between commercial banks and Incentive-based risk-sharing schemes such as GIRSAL; adoption of loan guarantee schemes; government's intervention; recruitment of graduates with technically with an agricultural background as credit officers and establishment of technical and special units specifically responsible for agribusiness transactions. Also, collaboration with international bodies such as OVCF and AfDB and operation of loan recovery accounts were identified as some of the best strategies to mitigate credit risk in agricultural finance. It was also said that agricultural loans should be structured and released in tranches to ensure loans are used for the intended purpose to reduce credit losses. Value chain finance, knowing your customer assessment, collaboration with off-takers, and regular monitoring was suggested as good effective strategies that can be used by commercial banks to mitigate credit risk. This implies that Ghanaian commercial banks cannot completely mitigate credit risk exposure in agricultural finance without fully adopting these strategies identified during the interview. Strategies identified such as agricultural value chain finance, collaboration with off-takers, incentive-based and risk-sharing schemes, proper structuring of agricultural loans excluded in the questionnaire were some of the strategies unveiled during the interview and significantly complemented the results discussed in this section. Knowing your customer principle or credit history information of customers was also identified as

one of the strategies used in mitigating credit risk associated with agricultural lending. This conforms to the BoG policy requirement discussed in section 5.6.2.6. The results further conform to Wanjohi (2016) who evaluated credit risk management among commercial banks in Kenya and Noman et al. (2015) who examined private local private commercial banks in Bangladesh and indicated that borrowers' credit history affects repayment of loans and must be considered bank banks in granting credits. Contrarily, quantitative results indicated that the credit history of borrowers is not most frequently preferred as the first option strategy factor in the credit risk management policy implementation process. To provide adequate and more information for comparison and evaluation regarding the implementation of credit risk management policies in Ghanaian commercial banks, some major policies of BoG were analyzed in section 5.6.

5.6 Analysis of Policy Documents from BoG for the Effectiveness of the Implementation of Credit Risk Management Policies

The document analysis in this section supplements the quantitative and interview data discussed in sections 5.3 and 5.5 to evaluate objective two which is the effectiveness of the implementation of credit risk management policies of commercial banks on agricultural finance. To build a solid financial sector in developing countries, there is a need for effective regulations and a supervisory framework within the sector. As a result, different forms of regulation have been established after the financial crises between 2007, and 2009 in many countries as well as Ghana to protect, and regulate the financial sector (Abdallah, 2015). Subsequently, the financial sector in Ghana has gone through a lot of transformation and restructuring to create a vibrant sector in sub-Saharan Africa. Therefore, the financial system has experienced a rapid transformation over a few years, creating new opportunities and risks where Ghanaian banks now function as intermediaries. Authorities including commercial banks have been implementing the reforms to strengthen the financial regulatory and supervisory framework. Ensuing, it is expected that the Central bank of Ghana which has the overall regulatory and supervisory authority in all banking-related businesses in Ghana, enforces a competitive, efficient, reliable, and sound financial system (Abdallah, 2015). There is continuous pressure to further strengthen the regulation and supervision of banks to protect the financial environment particularly the sector, consumers, and borrowers. An effective financial

environment provides adequate disclosure requirements, a good legal framework, reliable policies, and the best practices in mitigating credit risk in agricultural lending. Effective credit risk management practices of commercial banks require the Bank of Ghana to adopt a risk-based approach to supervise banks for the implementation of appropriate corporate governance practices and undertake best credit risk management practices to minimize risk exposure (Owusu-Antwi, 2009).

This section reviewed and analyzed policy documents on the regulatory, and supervisory framework of the banking sector supervision department of the BoG to evaluate the methods used to identify credit risk; the effectiveness of the implementation of credit risk management policies in agricultural lending, and the strategies used by commercial banks to mitigate credit risk associated with agricultural lending. Over the years, the Central Bank of Ghana has been making an effort to operate its regulatory and supervisory framework following international standards. Different legislative environments have been established with much effort to develop and improve risk-based supervision for the implementation of the Basel Accord (BoG, 2020). The study examines the policies put in place by the banking sector supervision department of the bank of Ghana to regulate commercial banks as a guide to provide appropriate credit risk management strategies to minimize credit risk exposure of commercial banks in agricultural lending. Commercial banks in Ghana, operate within the legal, and regulatory frameworks namely Bank of Ghana Act, 2016 (Act 918); Banks and Specialised Deposit-Taking Institutions Act, 2016 (Act 930); Companies Act, 2019 (Act 992); and Bank of Ghana Notices /Directives / Circulars / Regulations requiring the banks to adopt best practices to manage credit associated with lending. Banking supervision is therefore key in credit risk management. The Bank of Ghana exercises exclusive regulatory, and supervisory authority in all matters concerning banking to achieve a solid, and efficient banking system (Obuobi, Nketiah, Awuah, & Amadi, 2019). The Bank of Ghana is empowered by Act 918 to ensure the stability of the financial sector to facilitate wealth creation, economic growth, and development including the agricultural sector. The role of banking operations, the financial system of a country, and regulatory authorities are defined by the banking regulations, supervision, and governing principles (Atuguba & Dowuona-Hammond, 2006).

5.6.1 Banking Regulations and Policies in Agricultural Lending

Banking regulations and policies play significant roles in lending. Banking regulations and policies are expected to provide adequate information on lending and its associated risk and how these risks can be managed to promote lending as a viable business. The banking sector is the most regulated sector of the Ghanaian economy (Owusu-Antwi, 2009). Banking regulations concern the policies that govern the banking system whilst the supervision deals with the oversight that ensures the compliance of the banking operations (Salami & Larmie, 2013). Banking sector regulations and supervision are controversial issues that need to be carefully handled (BoG, 2019). Simply put, weaknesses in banking regulations and supervision contribute largely to the banking failure crisis resulting from high credit risk. In addition, weaknesses in banking supervision provide opportunities for high risk-taking by commercial banks and possible crises (BoG, 2019; Kwakye, 2012). Therefore, solid regulations and effective supervision of the banking sector are required to protect depositors and prevent loan losses (BoG, 2020). It is therefore necessary to protect the banking system with sound regulations and proper supervision to prevent the contagious effect of banking failures resulting from poor lending decisions and their associated high credit risk (BoG, 2020). Implying, good lending decisions are very significant in minimising the credit risk associated with agricultural lending. The Banks, and Specialised Deposit-Taking Institutions Act, 2016 (Act 930), as well as the Borrowers, and Lenders Act, 2008 (Act 773) described lending in banking operations as the act of granting of credits or loans to borrowers with the assurance that, the loan together with interest would be returned within a stipulated timeframe. Generally, regulatory framework did not adequately address lending and its associated high credit risk. Resulting, BoG in 2018, declared the Borrowers and Lenders Act, 2008 (Act 773) as inadequate in addressing increasing challenges confronting credits or loans, and acquisitions. Stakeholders have also disclosed that the provisions of Act 773 in its current form are inadequate and deficient as a result of the absence of key critical provisions. Some of the deficiencies discovered in the Act include the absence of provisions on the enforcement of borrowers' obligations; exclusion of credit agreements where parties are not considered to be dealing in arms-length such as familiar related credit transactions, and loans of shareholders. The limitations of Act 773 defeats the general objective of achieving a secured modern transactions regime that facilitates access to credits and

minimizing credit losses resulting from bad loans (BoG, 2018). Following this, the BoG in partnership with the International Finance Corporation recommended the new Borrowers, and Lenders Act to address the bottlenecks that impeded the advancement of credit to borrowers. Consequently, the BoG under the mandate of section 7 of Act 773 issued the Rules for effective implementation of the Borrowers, and Lenders Act, 2008 (773) popularly known as the Registry Rules to address the inadequacies, and deficiencies in Act 773 to effectively manage credit risk arising out of lending activities. However, the new registry rule generally addressed lending risk with absolutely no attention on agricultural lending. Simply put, banking regulations in Ghana have inadequate guidelines and rules with respect to agricultural lending and its associated high credit risk. In emerging economies such as Ghana, where loans are regarded as very essential, and a major source of finance for agricultural borrowers in many aspects (Owusu-Antwi, 2009), there is the need for BoG to adequately come out with specific regulatory requirements for agricultural lending and its associated credit risk. The policy documents have been described in details in section 5.6.2.

5.6.2 Review, and Analysis of Policy Documents on Credit Risk Management

This section discussed the policies of BoG regarding credit risk management in agricultural lending. Bank of Ghana must ensure that commercial banks do not pose a threat to depositors, and borrowers, thus maintaining high confidence in the banking system. As a result, the Banking Supervision Department of the Bank of Ghana has outlined relevant policies concerning the operation of commercial banks (BoG, 2020b; IMF, 2014) which are essential, and critical in minimizing credit risk exposure of Ghanaian commercial banks in agricultural finance. Policy documents of the Bank of Ghana relating to the operations of commercial banks aimed at mitigating the effects of credit risk exposure were reviewed, analyzed, and subsequently discussed. The policies, and guidelines concerning the supervision, and monitoring of commercial banks for effective implementation of laid down policies, guidelines, and regulations were summarized in 8 sub-sections. They include Credit Agreement Policy, Credit Guarantee Policy, Policy on Training, and Professional Competency of Staff, Reporting Requirement Policy, Examination, and Investigation Policy, Knowing Your Customers Policy, Minimum Capital Requirement Policy, and Risk Monitoring, and Review Policy.

5.6.2.1 Credit Agreement Policy for Managing Credit Risk in Agricultural Lending

By the Credit Agreement Policy, lenders are required to provide written copies of the credit agreement to borrowers. The written agreement produced by the lenders which in this study are commercial banks must be signed by both the borrowers and authorised representatives of lenders. The credit agreement is required to be executed per the terms stipulated by both parties. The credit agreement is expected to adhere to the required information, format, and any further amendments indicated in the Collateral Registry Rule established by the parliament of Ghana under the Borrowers, and Lenders Act, 2008 (Act 773). The purpose of the Credit Agreement Policy is to create an enabling environment to promote easy access to credits, and repayment of loans in commercial banks to reduce credit losses (BoG, 2020). Therefore, the establishment of the Collateral Registry by the Bank of Ghana under the Borrowers, and Lenders Act, 2008, (Act 773) intends to spearhead a secured credit transaction regime for creating, prioritizing, and enforcing security interest on property in credit granting to borrowers. It involves the provision of information with credit products and services stipulated in the rules, terms, and conditions outlined in the rules. The credit agreement includes the general guidelines of BoG, and Act 773 highlighted:

- All the clauses in the credit agreement must be presented unambiguously, and be in simple language such that, the comprehension of consumers, clients, and borrowers is maximised;
- Also, the agreement between the lenders and borrowers must contain a detailed schedule of payments that indicates the date in which the agreement was constituted, the amount of credit involved, the repayment method agreed upon, the repayment amount as per the agreement, and scheduled credit payments;
- In situations where the clauses are seemed contradictory in the credit agreement, the interpretation which best favours the consumer, client, or the borrowers prevails.

Discussing on Credit Agreement Policy for Managing Credit Risk in Agricultural Lending

The Credit Agreement Policy of the Bank of Ghana regarding the supervision of commercial banks was very detailed and effective. This policy implies that; all commercial banks were required to develop a Credit Agreement Policy with their borrowers before credits are administered. The Credit Agreement Policy developed by commercial banks should detail the content, and requirements of borrowers. The policy also requires commercial banks to be very rational by requiring a secured property as collateral to minimize loan losses. It further requires that commercial banks and borrowers have to mutually agree to the content, all the terms, and conditions indicated in the Credit Agreement Policy to make it valid for legal purposes. The policy suggests that credits would not be advanced if the commercial banks and borrowers do not agree, and reach a consensus. The Credit Agreement Policy also suggests that commercial banks that do not have credit agreement policies or have defective Credit Agreement Policy, would have credit recovery problems, and would likely result in huge credit losses. However, the quantitative results revealed that this policy is not properly implemented. The quantitative evidence indicated that even though Ghanaian commercial banks commercial enforces agreements in the formed bonding with agricultural borrowers' it is usually not preferred as the first option in managing credit risk. This further contradicts the findings Addae-Korankye (2014) who investigated the causes of loan defaults among micro-financial institutions in Ghana and posited that borrowers should be bonded to effectively minimize credit risk exposure in agricultural finance. This implies that commercial banks could develop standard credit agreement policies but may not effectively implement them in agricultural lending which would eventually result in credit losses. Even though the agricultural sector is considered the most important sector by the Ministry of Foods, and Agricultural (MoFA, 2020), and seriously needs finance to develop, the document analysis revealed that there are no detailed Credit Agreement Policy guidelines made by the Bank of Ghana specifically for commercial banks regarding agricultural lending. Simply put, there is no specific credit agreement policy with special consideration regarding agricultural finance. The credit agreement policy is general. With agriculture being considered as the fundamental sector that drives the fortunes of emerging economies particularly Ghana (MoFA, 2020), the sector needs more attention, and hence the need

for specialized Credit Agreement Policy regulations established by the Bank of Ghana specifically for the sector to encourage agricultural lending in commercial banks as a viable business. Another policy worth mentioning is the credit guarantee policy discussed in section 5.6.2.2.

5.6.2.2 Credit Guarantee Policy for Managing Credit Risk in Agricultural Lending

A credit guarantee is an agreement where a third party undertakes or promises to satisfy on-demand an obligation of a borrower in a credit facility or credit transaction to which this Act applies. (Borrowers and Lenders Act, 2008, Act 773). By the Credit Guarantee Policy, borrowers are required to provide collateral security or guarantors as part of credit agreements before loans are granted as stipulated by the Borrowers, and Lenders Act, 2008, (Act 773). Guarantors, therefore, provide a guarantee for credits secured by borrowers to protect the banks against possible credit losses resulting from defaults. Consequently, the following guidelines established by the Banking Supervision Department of the bank of Ghana are required to be implemented by lenders for borrowers who produce guarantors to secure credits from commercial banks:

- Before persons or individuals acting as guarantors, lenders must officially write:
 - Advising guarantors of the extent, total amount, and nature of possible liabilities relating to the credit sought by borrowers.
 - Advising guarantors to seek legal advice before committing to acting as a guarantor against a credit facility offered by commercial banks to borrowers.
- Notifying the guarantors of the impending disbursement of loans/credits before its disbursements.

Following the above guidelines, the Bank of Ghana is required to effectively supervise, and enforce the statutory policy guidelines. In addition to the Borrowers, and Lenders Act, 2008 (Act,773), the Bank of Ghana is charged with promoting, and supporting the development of a transparent, fair, accessible, and competitive, credit market in the banking industry. Also, the Bank of Ghana is required to receive all complaints in writing about suspected breaches, and find appropriate ways of managing such breaches to mitigate against credit losses. Continuously, the Bank of Ghana is responsible for monitoring the credit market in detecting and preventing conducts that are prohibited by

Act, 773 to provide assurance, and confidence in the banking industry by minimizing credit risk exposure of the Banks. Ensuing, BoG is empowered to initiate proceedings against commercial banks that contravene the rules of the Act. An investigation is conducted by BoG to ensure that banks comply with the Act to minimize credit risk exposure of commercial banks. The BoG is also charged with the responsibility of issuing and enforcing compliance orders. This implies that guarantors must comply with the necessary compliance regulations in securing loans for the borrowers.

Adding, promotion of public awareness of credit relating matters by the use of public education, designing, and disseminating information to the general public; providing guidelines to credit market as well as the industry; and adopting measures in developing awareness of guarantors, and the general public of the provisions and guidelines of Act 773 provides a reliable way of minimizing credit losses (Bokpin, 2013). The policy further requires the Bank of Ghana to advise the sector Minister on matters relating to credit, and on standards determination to protect the rights of borrowers as well as the Lenders; the commercial banks in this context. Consequently, periodic annual reports on the volumes and costs relating to different types of credits from various products, credit market practices relating to the products offered as well as their implications for the choice of borrowers, and competition in the market are required to be prepared to the Minister by the Bank of Ghana.

Discussing on Credit Guarantee Policy for Managing Credit Risk in Agricultural Lending

The Credit Guarantee Policy guidelines instituted by the BoG for commercial banks are very comprehensive and effective. Commercial banks that would comprehensively implement this policy are likely to reduce large credit losses as borrowers would mostly secure credits by credit guarantee provided by guarantors in good standing. The findings from the document analysis conformed to the interview results that agricultural borrowers were only granted credits by commercial banks upon the provision of collateral or a credit guarantee. However, the quantitative data produced contradictory results. The quantitative results in section 5.3.2 indicated that commercial banks do not frequently use credit guarantee schemes in the credit risk implementation process to minimize credit risk. This contradicts Wubin et al. (2020) who explored credit-granting schemes in Ghana

using descriptive statistics and identified regular use of credit guarantee schemes as one of the efficient strategies of mitigating credit risk in agricultural finance. To make the Credit Guarantee Policy more effective, the Banking Supervision Department of the Bank of Ghana would have to be more proactive in its supervisory duties by ensuring effective monitoring and evaluation among commercial banks. However, regarding the requirements for collateral to secure against loan losses, investors, and farmers who engage in small, and medium agribusiness lack the needed collateral to secure a loan for agricultural activities (BoG, 2021; MoFA, 2020). Most small and medium-term agricultural enterprises live from hand to mouth and have no collateral to acquire credits from commercial banks for agricultural activities. Also, it is most difficult for small, and medium-term agribusinesses to attract guarantors as a result of their low-income nature, and lack of a good asset base. From this review, it was also noted that, the credit guarantee policy is general to all the commercial banks and borrowers regardless of the sensitive nature of the agricultural sector which needs specific and special policy considerations to develop. The policy, therefore, favors the large-based agricultural businesses which have larger capitals to attract guarantors and hence loans from the commercial banks. The training and competencies of bankers are required to effectively implement credit policies and administer credits to reduce loan losses associated with agricultural lending. This has been discussed in the following section 5.6.2.3.

5.6.2.3 Training, and Professional Competence Policy for Managing Credit Risk in Agricultural Lending

Training and professional competence are very significant in minimizing credit risk in commercial banks. Training and competencies do not only increase Cashflow but most importantly expand the lifespan of the banks. Lenders such as commercial banks are required to train and develop the professional competence of their staff (BoG, 2020). To promote the development of staff training, and professional competencies to improve debt collection, lenders such as commercial banks must undertake continuous professional development activities to acquire relevant skills in managing credit-related risks (Kitonga, 2017). Consequently, the BoG requires commercial banks to conduct an assessment of the training needs of their staff to: ensure that staff members are appropriately trained; ensure that all staff is properly supervised; and also ensure that staff with a high level of

competency carry out the following responsibilities: Competent, and experienced staff should be assigned to deal directly with borrowers; Pre-agreement statements should be prepared by well qualified, and competent staff; competent staff should be assigned for the preparation of advertisements and should be done about the requirements of the rule, and lastly lenders such as commercial banks are required to assign competent staff to market all services and products at hand which is offered by the lenders.

Subsequently, Chowdhury and Alam (2020), in a study on the impact of ethics on the performance of commercial banks in Bangladesh postulated that commercial banks are required to establish a code of conduct and make it available to promote the professionalism and ethical standards of credit staff to minimize loan losses. In furtherance, the code is intended to commit commercial banks, and their management, employees as well as the Board to a high professional standard of behavior, the conduct of business, and highly sustainable banking practices. Implying, the directors, employees, and key management personnel of commercial banks must sign off suggesting their understanding of the code as well as sanctions when the policy is breached.

Discussion on Training, and Professional Competence Policy for Managing Credit Risk in Agricultural Lending

Regarding the above policy, the Banking Supervision Department of BoG has established adequate, and comprehensive policy guidelines as discussed. Bank of Ghana would now have to put in place inevitable supervisory duties to ensure that commercial banks comply with the policy guidelines to effectively minimize credit losses in agricultural finance through the services offered by well-qualified, and competent loan officers. The policy discussed above implies that the training and development of officers who manage credits are key in mitigating the impact of credit risk in agricultural finance. Credit officers who are well trained would develop their skills, confidence, and professional competence in credit management on loans granted to borrowers. The policy requirements discussed above imply that commercial banks may seriously have credit management problems if they do not have adequate, and qualified credit officers to manage credits in agricultural finance. The training, and professional development requirement policy further suggests that credit might easily be poorly managed if commercial banks do not have well-trained professional personnel to manage credits or if credit management is left in the hands of

the wrong personnel. It further implies that even though the training and professional development policy established by the BoG for commercial banks is relevant in minimizing credit losses in commercial banks, failure on the parts of commercial banks to comply with the policy requirement could result in huge credit losses in agricultural finance. This policy implies that training on the job in commercial banks is very effective in minimizing credit risk exposure in agricultural lending. This is evidenced from the interview results which indicated that most of the credit officers of GCB, ADB, SBG, and PBL were mostly trained on the job. However, the interview results further showed that credit officers were recruited from various fields of study including psychology, accounting, sociology, economics, and political science among others to administer agricultural credits. The interview again revealed that some banks do not have technical units specifically responsible for agricultural credit administration and its associated high credit risk. This hinders the full implementation of this policy in minimizing credit losses in agricultural finance. Not all, quantitative results in section 5.3.3 indicated that Ghanaian commercial banks do not most frequently consider training and professional competencies as credit risk mitigation strategies and hence did not conform to the training requirement of BoG. With the agricultural sector considered by the Ministry of Foods and Agricultural (MoFA, 2020) as the best in the creation of employment and food among all the sectors of the Ghanaian economy, it is imperative that the BoG effectively monitors the capacity of personnel who are involved in the credit management chain of commercial banks in the granting of loans regarding agricultural activities. Regardless, the analysis indicated that there is no specific policy requirement for commercial banks and agricultural credit officers who need special skills to manage agricultural credits and related credit risk. BoG must assess commercial banks' performance through their regular reports spot any potential credit risk before they get out of hand. The following section 5.6.2.4 discussed the reporting requirement of commercial banks.

5.6.2.4 Reporting Requirements Policy for Managing Credit Risk in Agricultural Lending

By section 93 of the Banks, and Specialised Deposit-Taking Institutions Act, 2016 (Act 930), commercial banks are required to prepare periodic reports for supervision. The reporting requirement policy indicates that commercial banks are expected to report to

the BoG weekly, monthly, quarterly, bi-annually, and annually. By the weekly reporting, commercial banks were required to furnish their liquidity position to the BoG for evaluation. The liquidity requirement reports are expected to include cash on hand of the commercial banks, bank balances, customers' deposits, and all investments with the banks. The reason for the liquidity reporting is to compare the short-term liquid assets of commercial banks with their respective short-term obligations to mitigate against future operating, and credit losses (BoG, 2019). In furtherance to the weekly reports, the BoG expects commercial banks to furnish a summary of their monthly reports regularly without fail. The monthly reports are required to cover critical areas including prudential reports, collateral returns, and institutional exposures. The prudential reports include summary information on deposits, current, and non-current assets, and liabilities. Essentially, the monthly reports to the BoG also cover reports on loans, and advances giving detailed descriptions of both performing, and non-performing loans by various commercial banks. Preceding, any anticipated effects resulting from credit losses in agricultural finance by the commercial banks would easily be determined through the monthly reports in minimizing credit risk exposure of these banks.

The BoG requires commercial banks to report on collateral registration²⁰ for loans granted monthly. This enables the BoG to evaluate the validity of collateral to minimize credit risk exposure of commercial banks. Section 24 (1) of the Land Registry Act 1962 (Act 122), states that a document shall be of no effect until it is registered, implying that documents are not valid for all purposes because the formality of registration is necessary to complete their validity for legal purposes. The collateral registration framework for credit seeks to enhance information disclosure standards by both Borrowers and Lenders by prohibiting particular credit practices as well as promoting a consistent credit enforcement framework and other related matters. This improves the mechanism necessary for the enforcement of credit agreements. However, lenders are not mandated to institute legal actions in court in exercising their rights to take possession of a property, intending to enforce possessory rights in the event of defaults. The directives of the monthly collateral registry report are

²⁰The Collateral Registry is a body established by Parliament under the Borrowers and Lenders Act, 2008 [Act 773] to principally register charges and collaterals created by borrowers to secure credit facilities provided by lenders (Borrowers, and Lenders Act, 2008, Act 773).

in response to the alarming challenges in the Ghana credit market which constrained the flow of credits to SMEs particularly the agricultural sector. The monthly evaluation by the BoG of all significant documents minimizes the credit risk exposure of commercial banks. All the funds of commercial banks with other financial institutions and vice versa are required to be disclosed in the monthly report.

Besides, lenders such as commercial banks are required to furnish quarterly reports. The quarterly reports contain complaints received from the customers of the banks within the quarter. Commercial banks are also expected to report on the staff of the banks who have committed fraud by whatever means. Commercial banks are further expected to submit **bi-annual**, and annual reports to the BoG through the Supervision Department. The **biannual** and annual reports should contain all the assets, and liabilities of the banks as well as details of their credit portfolios. The reports expected to be furnished to the BoG enable the Supervision Department to examine the capital adequacy and minimum capital requirement compliance; verify assets, and liability compositions as well as the adequacy of liquid assets in meeting all obligations; examine the quality of assets earnings, efficacy; and standards of performance; determine the banks' ability to adopt effective credit risk management practices and continue to address possible risks associated with lending. Commercial banks are therefore required to comply with the format of reporting and shall attract sanctions/penalties if they fail to comply (BoG, 2021: Biekpe, 2011). In an extreme case, the license is revoked.

Reporting Requirement Policy for Managing Credit Risk in Agricultural Lending

The reporting requirement policy initiated by the BoG for commercial banks is very detailed, reliable, and comprehensive but not adequate as BoG prudential requirements for commercial banks did not specifically include reports on agricultural lending and its associated high credit risk. The policy implies that the BoG can detect possible credit threats by assessing, and evaluating the total loans granted by commercial banks; the quality of loan portfolios; total assets, and liabilities; adequacy of credit officers, and capital adequacy requirements of commercial banks. Further, the reporting policy requirement also implies that the Bank of Ghana would easily assess, and measure possible impaired, and non-performing loans in commercial banks on a timely basis if detailed operations of commercial banks are reported as per the format required in the

policy. The analysis suggests that BoG might not be able to assess and measure possible credit risks such as non-performing, and impaired loans if the weekly, quarterly, and annual reports provided by the commercial banks are defective, fall short of facts, and are detailed records. These requirements did not give details of how loans given by commercial banks specifically for agricultural purposes would be reported and monitored. It is, expected that proper books of accounts particularly relating to agricultural lending and its associated credit risk management, are kept by commercial banks and should be well supervised, and monitored by the Banking Supervision Department of BoG to minimize possible credit losses. This is missing in the policy document on reporting requirement of BoG. Regarding collateral, however, lenders such as commercial banks have no effective way of searching for charges²¹ on properties that have been offered for credit. This is due to the several endless litigations, and a significant rate of non-performing loans which are usually recorded in the lenders' books of accounts. In the same way, members of the commercial banks have no effective means of searching to assure as to whether the charge property has already been used as collateral or genuinely the bona fide property of agricultural loan applicants. There is the need for a thorough examination and investigation of all the documentation and practices adopted by commercial banks to minimize credit risk exposure in agricultural lending discussed in section 5.6.2.5.

5.6.2.5 Examination, and Investigation Policy for Managing Credit Risk in Agricultural Lending

This section explained the examination and investigation policy which are significant in mitigating credit risk exposure of commercial banks in agricultural lending. It is expected that BoG examines all the commercial banks licensed to operate in Ghana. By section 94 of the banks and Specialised Deposits-Taking Institutions Act, 2016, (930), the BoG is required to examine the affairs and operations of each commercial bank operating in Ghana. The BoG is expected to carry out the examination of the commercial banks at the frequency, and time which it considers appropriate and prudent. The evaluation

²¹Charge refers to, mortgage, security, interest, lien, pledge, assignment by way of security, covenant, restriction, reservation, lease, trust, order, decree, judgment, title defect (including retention of title claim), or any other encumbrance of any nature other than liens arising by operation of law' (Borrowers, and Lenders Act, 2008, Act 773).

considered appropriate by BoG on commercial banks considers potential credit risk faced by each commercial bank in their operations.

The requirements of section 94 of Act 930 on the examination of commercial banks in their affairs and operations fall within the regulatory and supervisory controls of the BoG. The examination role of the BoG is statutorily required, and not discretionary. In addition to the examination role, the BoG is also required by section 95 of the banks and Deposits-Taking Institutions Act, 2016 (Act 930) to investigate or scrutinize specific matters or activities or offices regarding the affairs of commercial banks. The investigation may be conducted without prior notice. Implying, the BoG does not have to always give notices to the commercial banks before an investigation is carried out. Resulting, the BoG may use the services of professionals such as lawyers, qualified accountants as agents to carry out the investigations on its behalf. It means that the BoG has the authority to delegate its role to professional accountants and other professionals to act in its representation.

Consequently, section 96 of Act 930 stipulates that,

'A person who is authorized by the Bank of Ghana to examine, investigate, or for any other purpose, shall have a right of access to the books and records of the bank, Specialised deposit-taking institution, financial holding company, or any other member of the financial group. For subsection (1), the books and records include documents, minute books, customer files, personnel files, cash and securities, and information in an electronic medium'.

The investigators may call upon the directors; key management personnel; other employees of the banks; members of the financial group; external auditors; persons whom the banks have outsourced their functions, any person with information that the investigator considers necessary. The request may either be written or oral. The participants are required to comply with the request of the investigator, and failure to comply attracts sanctions and penalties. Again, BoG furnishes a copy of the report to the examined commercial bank and expected the banks to provide a written explanation of the findings identified in the report within Forty-five days starting from the date of receipt of the report before an action is taken with a specified period.

Discussion on Examination, and Investigation Policy for Managing Credit Risk in Agricultural Lending

The policy regarding the examination and investigation of commercial banks established by the BoG is very adequate, and would likely result in reducing credit losses in agricultural finance if commercial banks comply with all the policy requirements. However, this policy is general and does not specifically relate to agricultural lending despite the risky nature of agricultural finance and its inevitable credit risk which needs special attention. Consequently, commercial banks must conduct an examination and investigations that are adequate, reliable, effective, and consistent with the policy requirements of the BoG to effectively manage the credit risk exposure of these banks in agricultural lending. The policy requirement also implies that the BoG must regularly examine, and investigate the operations of commercial banks for compliance to mitigate against the effects of credit losses of commercial banks in agricultural finance. The policy further implies that the engagement of professionals such as Lawyers, and qualified Accountants by the BoG for the examination, and investigation of commercial banks, must discharge their duties, objectively, and independently without biases. Any form of influence by either the commercial banks or BoG on the professionals that have been engaged would render the exercise unreliable in the effort of managing credit risk associated with a loan granted to borrowers for agricultural purposes. As part of the examination by the professionals, it is imperative to note investigate the historical background of the agricultural borrowers. By implication, knowing the customers' assessment of commercial banks discussed in section 5.6.2.6 is key in reducing loan losses and minimizing credit risk exposure in agricultural lending.

5.6.2.6 Knowing Your Customer Policy for Managing Credit Risk in Agricultural Lending

The BoG has established the Knowing Your Customer Policy (BoG, 2019) as a requirement for commercial banks to comply to assess the credibility of borrowers as a means of minimizing credit losses. The committee on banking supervision (Basel, 2015) specifically published a paper on customer due diligence purposely for banks. The report issues some guidelines for implementing customer due diligence in banks. The essence of the report was to enable banks to identify the relevance of ensuring the adequacy of

controls, and procedures put in place to appropriately identify, and know very well the customers they deal with in everyday activities. The Basel Committee also intended to provide a framework that serves as a benchmark for supervisors such as the BoG in establishing national practices, and for banks to also design their risk management strategies to especially reduce credit risk exposure in agricultural lending.

Relatively, the requirements of the document were very consistent with the number 15 principle the Basel Core Principles of Methodology which stressed the need for banking supervisors to ensure, and examine the adequacy of policies, practices, and procedures, and also particularly knowing their customers to promote standard ethical, and professional standards in the banking sector (Basel, 2015). This prevents the banks from being exploited by criminals either intentionally or unintentionally.

In fulfillment of the objective above, the Banking Supervision Department of BoG provided a due diligence guideline document to all the banks as a guide to establish 'Know Your Customer' policies, and procedures. The 'know your customer' policy required by the BoG to be established by commercial banks must take into consideration the credit history of borrowers, nature, and business activities of borrowers, repayment capacity of borrowers, Cashflow of borrowers, location of borrowers, and profession of borrowers. The credit referencing bureaus play a significant role in providing credit information of borrowers for commercial banks to know their borrowers very well before advancing credits (BoG, 2019). The policy ensures that commercial banks in Ghana develop customer acceptance policies, and procedures that serve as guides and identify customers, and borrowers who are possibly likely to pose potential credit risk to the banks as far as lending is concerned particular (BoG, 2019).

Discussion on Knowing Your Customer Policy for Managing Credit Risk in Agricultural Lending

The policy discussed in this section would be very effective if it is well implemented by commercial banks to establish the credibility of potential borrowers in the agricultural sector through information sharing to reduce credit risk exposure (Brown et al., 2009). The findings from the analysis of this policy document conformed to the interview results indicated in section 5.5.5 that, commercial banks must know all available information

about their agricultural borrowers to avoid bad loans in agricultural lending. This policy is however not well implemented. Quantitative results in section 5.3.2 indicated that Ghanaian commercial banks do not most frequently consider 'knowing your customer' policy in the credit risk management implementation process regarding agricultural lending. It is possible because, unlike developed countries where all creditors, borrowers, house addresses, and street names are well furnished and documented with more structured credit bureau institutions (Brown, Jappelli, & Pagano, 2009; Djankov et al., 2007), Ghana is noted for poor address system, and inability to maintain very robust Credit Referencing Bureau Institutions (Kusi et al, 2016). This probably made it practically very difficult for commercial banks to obtain all relevant information about potential borrowers in agricultural finance. Also, most borrowers' information was not kept with the few credit referencing bureaus institutions in Ghana making it difficult for commercial banks to obtain reliable information about such borrowers. This implies that, commercial banks do not have comprehensive KYC procedures, and that commercial banks were not adopting rapidly in conforming to international requirement standards observed by BoG (2017). The analysis indicated that there is a need for robust credit referencing bureau institutions in Ghana empowered by the Bank of Ghana to effectively capture all credit information of borrowers. It also indicated the need for proper digitization of address systems in Ghana to provide adequate information about the credit history and location of borrowers to be accessed by commercial banks to make lending decisions regarding agricultural finance. In making agricultural lending decisions commercial banks are required to meet the minimum capital requirement expounded in section 5.6.2.7.

5.6.2.7 Minimum Capital Requirements Policy for Managing Credit Risk in Agricultural Lending

Banks are expected to meet the minimum capital requirement²² (BoG, 2019). The minimum capital requirement of banks is to ensure the capital adequacy²³ of the banks (Madugu et al., 2020). The requirements are relevant to ensure that commercial banks

²² Capital requirement is the minimum amount of capital a bank or financial institution must hold as required by its regulator (BoG, 2019)

²³ Capital adequacy is expressed as a ratio of equity as a percentage of risk weighted assets (Madugu, Ibrahim, & Amoah, 2020)

do not take excess leverage and become insolvent in their lending to agricultural businesses. The banking industry of Ghana has undergone three recapitalization programs in the last 17 years. It started in 2007 when banks were the stated capital of banks was increased from GH¢ 7 million to GH¢ 60 million, then in 2012 where banks were directed to raise their stated capitals to GH¢ 120 million, and in 2017 where the stated capital of banks was increased to GH¢ 400 million (Obuobi et al., 2019). The Bank of Ghana has established the minimum capital requirement policy of banks as part of its mandate to regulate the financial sector. By this policy, a universal plan for the financial sector reform has been instituted as a guide for commercial banks. The main reason for the minimum capital requirement policy is geared towards developing, strengthening, and modernizing the financial sector to advance the economic vision, and transformational agenda of the government to reduce potential credit risk (Obuobi et al., 2019). As a result, the bank of Ghana revoked the licenses of two insolvent banks (UT Bank, and Capital bank) as a warning to the rest of the banking sector, and also to prepare the grounds for further reforms (BoG, 2017). The Bank of Ghana has reached an agreement with affected identified banks, the way forward for recapitalization following the plan on capital restoration as stipulated by the Banks, and Specialised Deposits-Institutions Act, 2016 (Act 930).

Going forward, the Bank of Ghana requires all commercial banks to develop a solid sophisticated, and very robust capital framework adequately enough in transforming the banking sector. The framework is expected to be consistent with increasing levels of risk to which commercial banks are exposed. The Bank of Ghana in furtherance of the above, and line with section 28(1) of the Banks, and Specialised Deposit-Takings Act, 2016 (Act 930) reviewed upward, the minimum capital requirement of commercial banks from One Hundred, Twenty Million Ghana Cedis (GH¢ 120 million) to Four Hundred Million Ghana Cedis (GH¢ 400 million) (BoG, 2017). The requirement applies to both new entrants and existing banks. Under the minimum capital requirement policy, commercial banks are to meet the minimum capital condition through fresh capital injection; carry out capitalization of income surplus to meet the minimum capital requirement of Four Hundred Million Ghana Cedis; and can also combine the introduction of fresh capital injection, and capitalization of income surplus to meet the minimum capital requirement. However, banks

are prohibited from capitalizing revaluation reserves, financial instruments reserves through other comprehensive income, credit risk reserves as well as unaudited profit. Following the minimum capital requirement policy in 2017, all banks were given up to December 2018 to meet the new policy requirement of capital detailed as follows:

- Banks were required to maintain a minimum unimpaired paid-up capital of not less than the Four Hundred Million Ghana Cedis (GH¢ 400 million) stipulated by section 28(1), and (3) of the Banks, and Deposit-Taking Institutions Act, 2016, (Act 930)
- In the determination of the paid-up capital, commercial banks must not that, in furtherance to the provisions established in section 28(3) of the banks, and Specialised Deposit-Taking Institutions act, 2016, (Act 930), losses are prohibited to be set off against credit risk reserves, and unaudited profit but are adjusted with unaudited losses.
- Banks that have been approved are required to comply with the minimum capital requirement.
- All applications for a license to operate as commercial banks pending approval are required to meet the minimum capital requirement of the Four Hundred Million Ghana Cedis (GH¢ 400 million) before approval is granted.

The Bank of Ghana requires all commercial banks to comply with the minimum capital requirement policy. Failure to comply shall be dealt with in furtherance of section 33 of the Banks, and Specialised Deposit-Taking Act, 2016 (Act 930).

Discussion on Minimum Capital Requirement Policy for Managing Credit Risk in Agricultural Lending

The minimum capital requirement policy discussed above indicates that commercial banks need to obtain adequate capital to strengthen banks' efforts in mitigating the effects of credit risk particularly in agricultural finance. Capital adequacy has been employed by commercial banks and is measured as the total equity divided by the banks' total assets. The equity to assets ratio measures how much commercial banks' assets are financed with the capital of the owners and hence forecasting the capability of banks to absorb credit losses. Analysis from policy documents revealed that commercial banks in Ghana

have effectively implemented the minimum capital requirement policy. This is an indication of a positive move to minimizing credit risk exposure in agricultural lending. Berger and De Young (1997) used the moral hazard theory and indicated that banks that are thinly capitalized usually take riskier loan decisions which can potentially cause higher credit risk in agricultural lending. Also, equity available in banks is used to budget for large credit losses. Meaning that credit losses of banks resulting from agricultural loan losses can be set off against the banks' reserve fund created out of equity to minimize credit risk. Ali (2016) examined the main determinants of banks' profitability in Jordanian commercial banks from 2005 to 2014. The study adopted the ROA and ROE to measure the banks' profit. The results of the study showed a positive relationship between the quality of assets and the profitability of banks. Further, empirical evidence indicated the need for well-capitalized banks with high adequacy of capital to improve upon the profitability of commercial banks in Jordan. Torbira and Land Zaagha (2016) conducted a study on the impact of capital adequacy on the financial performance measures of banks in Nigeria. It was found that a significant long-run relationship exists between the financial performance variables and the capital adequacy parameters in the Nigerian banking industry. However, primary data result from Olalekan and Adeyinka (2013) indicated a non-significant relationship between capital adequacy and profitability of banks in Nigeria. Contradictorily, findings from the secondary analysis showed a significant positive relationship between capital adequacy and profitability of banks. This is similar to the views of Udom and Onyekachi (2018). Further, Rufo and John (2017) investigated the impact of credit risk on capital adequacy. The study considered 567 banks in the Philippines. Evidence of results from the study indicated that capital adequacy has no significant impact on the profitability of banks in the Philippines. Umoru and Osemwegie (2016) examined the importance of capital adequacy and the impacts on financial businesses in Nigeria. The authors adopted the generalized least square (GLS) estimation method using financial statements from 2007 to 2015. Findings from the study indicated that capital adequacy significantly impacts positively in promoting financial businesses in banks. In a study on the impact of capital adequacy Japanese banks on financial performance and economic results ranging from 2005 up to 2014, (Siti, Nusaibah, & Kazuhiro, 2016) found a significant relationship between the variables and performance. The relationship between financial performance and capital adequacy was

investigated by Ben Moussa (2013). The study sampled nineteen commercial banks from 2000 to 2009. Return on assets (ROA), return on equity (ROE), and net interest margin (NIM) were used for the capital ratio approximation and performance. A positive relationship was found between capital adequacy and the financial performance of banks. This result was confirmed by Mokatsanyane et al. (2017) and recommended banks to either increase or maintain an acceptable amount on capital to hedge against unexpected risks resulting from credit losses. However, Ikpefan (2013) had a different view. The author studied the extent of the impact capital adequacy, management, and performance of Nigerian commercial banks from 1986 to 2006. The study revealed that the capital adequacy ratio has negatively impacted the earnings of banks. When management efficiency and operational expenses were the measures, the results indicated a negative correlation between these parameters and the return on capital.

Abiola and Olausi (2014), indicated that the Capital adequacy ratio (CAR) is usually chosen in determining the performance of banks because it is the core measure of the performance of banks' financial strength for the view of the regulator. The authors posit that it is a ratio consisting of kinds of financial capital considered to be the most liquid and reliable of shareholders' equity. It was indicated that banks with very solid capital adequacy ratios are considered to be profitable. Given the empirical evidence above, it implies that the sufficiency of shareholders' funds can significantly contribute to the development and promotion of commercial banks in Ghana. Therefore, capital adequacy has been considered the best effective tool for ensuring banks' safety and soundness (Molefe & Muzindutsi, 2016). It suggests that with sufficient shareholders, the fund increases the performance and confidence of commercial banks to adequately hedge against global financial crises. Therefore, the good capital adequacy of commercial banks would be able to absorb advances that have gone bad without suffering many losses. Overall, the capital adequacy requirement established by the BoG is very robust, reliable, and effectively monitored by the Banking Supervision Department of the BoG in the discharge of its duties revealed through the interview. Banks that do not meet the minimum capital requirement are classified as posing potential threats in the banking sector and are prohibited by BoG operating (BoG, 2017). However, it is noted during the review that, there are no specialized banks with a focus on agricultural and with different

capital requirements. All the commercial banks are given equal regulatory capital requirements without any special attention on the agricultural sector. With a robust capital adequacy requirement, BoG must strictly monitor and review the activities of commercial banks to ensure compliance. Monitoring and review policy requirements by BoG are discussed in section 5.6.2.8.

5.6.2.8 Risk Monitoring, and Review Policy for Managing Credit Risk in Agricultural Lending

The BoG is required to monitor and review potential risks faced by commercial banks, the source of the risk, the likelihood of occurrence, and the extent of the impact on the operations of the banks. Positing, the BoG has established the Board Risk Committee which provides advice to the Board on the overall presentation and expected future risk tolerance of banks. The Committee also oversees the implementation of the best credit risk management strategies in commercial banks. The Risk Committee of the Board is expected to provide an independent appraisal and review of; credit risk management policies, and procedures of commercial banks; the composition of the credit risk portfolio of banks; all decisions regarding risk-taking including all areas of risk credit risk exposure of banks, liquidity as well as an operational risk; and any assignment associated with credit risk management in banks. Importantly, this policy requires the Board Risk committee to regularly, and annually review, and make recommendations regarding the risk management strategies undertaken by the regulated banks. This review shall include all policies, procedures, the models used as well as limits set to effectively reduce the credit risk exposure of commercial banks as stipulated by section 16 of the Banks, and Deposit-Taking Institutions Act 2016, (Act 930). It is also required by Section 17 of Act 930 that, the Board Risk Committee challenges the assessment, and measurement of key risks of banks; provides gives advice, and encourage the maintenance of credit risk culture in all commercial banks; monitors, and critiques the daily credit risk management practices undertaken by senior management of commercial banks; maintain a strong oversight, and review the execution and design of scenario analysis in banks; reviews the minimum capital adequacy requirement as well as the liquidity position of commercial banks; and reviews the information disclosure of external risk considering annual reports, and accounts.

The BoG is also required by section 18 of Act 930 to monitor the risk exposure levels of all commercial banks by reviewing the risk profile of the regulated banks; reports of management regarding the nature of as well as the extent of risk exposures of commercial banks; and key performance indicators of the banks. Also, the Bank of Ghana must ensure that the external, and internal auditors of commercial banks effectively perform their independent roles by providing reliable audit reports on a timely basis whilst addressing all the weaknesses in the controls, non-compliance with the policies, laws, regulations, and procedures, as well as problems identified in the audit reports.

Risk Monitoring, and Review Policy for Managing Credit Risk in Agricultural Lending

The monitoring and review policy implies that the Board Risk Committee which advises the board on the potential credit risk faced by commercial banks should be well-constituted to effectively manage credit risk exposure in agricultural lending. Consequently, the Board Risk Committee should be made up of professional, and competent people with adequate knowledge of credit risk management. The policy further implies that the risk management committee should regularly monitor, and evaluate risk policy guidelines, practices by considering the possibilities of establishing new guidelines as well as effective credit risk management practices in areas considered to be weak or defective. The risk management committees in commercial banks should regularly report to the board, provide recommendations, and follow up to ensure compliance. However, findings from the analysis of this policy contradict the results obtained from the PCA analysis in section 5.3.3. The quantitative results from section 5.3.3 indicated that Ghanaian commercial banks do not frequently consider credit risk monitoring and review as the most preferred strategies used to mitigate credit risk associated with agricultural lending. The interview results in section 5.5.5 also confirmed the lack of effective monitoring and review of credit transactions and credit risk associated with agricultural lending as borrowers were reported to be avoiding and hiding from credit officers after receiving agricultural credits. The interview further revealed that monitoring and review have become a challenge for commercial banks as a result of the scattered nature of the borrowers and its associated high monitoring cost. The findings contradict Nwude and Okeke (2018) who used the OLS regression model to evaluate the impact of credit risk

on the performance of Nigerian banks and found that monitoring and review were very significant in minimizing credit risk. The findings of Nwude and Okeke (2018) are not different from Odonkor (2018). This implies that the monitoring and review policy requirement of BoG for commercial banks is not well implemented. Additionally, there is no special risk monitoring and review policy specifically regarding agricultural finance in Ghana. The monitoring and review policies established by BoG universally apply to all the banks without special attention to the agricultural sector.

5.6.2.9 Comments on the Analysis of Policy Documents from BoG

This section summarized the findings of the policy document analysis. The policies include the policy on Credit Agreement, policy on credit guarantee, Policy on Training, and Professional Competency of Staff, policy on Reporting Requirement of banks, policy on Examination, and Investigation, policy on Knowing Your Customers, Minimum Capital Requirement Policy as well as the policy on Risk Monitoring, and Review. However, the review in this chapter indicated that some of the policies were not very well implemented by commercial banks, generic and other do not specifically relate to agricultural finance even though the sector is sensitive, risky, and needs special attention and different policy guides.

The Credit Agreement Policy stressed the need for borrowers, and lenders to reach a consensus through an agreement contract before credits are granted. The policy implies that commercial banks are likely to be exposed to high credit risk if the policies are very defective, or are not effectively implemented. The Credit Guarantee Policy emphasis the need for commercial banks to secure their lending through credit guarantee or collateral property. However, this policy seems to favor only agricultural borrowers with a large asset base to afford credits with collateral. Also, the small, and medium agricultural enterprises may not meet the requirements to secure a loan for agricultural purposes. The training and professional development policy require that officers in charge of the administration, and management of credits should be trained to acquire relevant expertise to effectively, and accurately manage credits to avoid credit losses. However, this policy has not been well implemented as commercial banks do not frequently consider it in their credit risk management process. Further, the reporting requirement suggests that

commercial banks should regularly furnish weekly, quarterly, semi-annually, and annual reports to the Banking Supervision Department of the Bank of Ghana for a proper review, and evaluation. The policy does not make provision for how transactions specifically relating to agricultural lending and its associated high credit risk should be reported. Similarly, the examination and investigation policy insists on regular examination, and supervision of commercial banks by the Bank of Ghana to minimize credit risk exposure. The use of professionals such as Lawyers and qualified Accountants must produce independent examination, and investigation without bias or being influenced to make their reports reliable. Besides, commercial banks need to comply with the 'know your customer' policy through information sharing from credit bureau institutions required by the Bank of Ghana if they want to minimize credit losses resulting from bad loans. This policy however has some lapses as Ghana is well noted for poor address systems, and that, the credit bureau institutions in Ghana are not very robust to capture all information about all borrowers. Banks are also required to comply with the minimum capital requirement policy to maintain adequate capital to provide a solid foundation for identifying and managing credit risk in agricultural finance (Owusu-Antwi, 2009). Commercial banks have complied with the minimum capital requirement policy except that this policy does not have special consideration for agricultural lending considering the special nature of agriculture and its significance. With regards to risk monitoring and review policy, findings indicated a lack of adequate monitoring by commercial banks in agricultural finance as a result of the scattered nature of agricultural borrowers in Ghana and its associated high cost of monitoring.

All the policies discussed in this section indicated that there is little or no special attention and a specific requirement on agricultural finance. The review further indicates that effective supervision by the Bank of Ghana is key in minimizing credit risk exposure of commercial banks in lending to agriculture. The policies established by the Bank of Ghana are good but if they are poorly implemented by commercial banks due to insufficient or poor supervision, and monitoring, credit risk management problems in commercial banks would continue to exist. Noting also is the fact that there is no detailed policy regarding credit risk management, particularly in agricultural finance considering that, agriculture is regarded as the foundation of the Ghanaian economy (MoFA, 2020), and needs special

attention to develop. MoFA suggests that, unlike the other sectors of the economy, the agricultural sector should be highly considered, and given special attention. Therefore, special consideration should be given to the agricultural sector in terms of credits, and risk management to develop. This consideration should reflect in the Bank of Ghana's policies established for commercial banks. In the development of policies, BoG should consider drafting comprehensive credit granting and credit risk management policies with special consideration on the agricultural sector. The subsequent section 5.7 discussed the summary of the chapter.

5.7 Chapter Summary

This chapter comprised the empirical results and interpretations of the exploratory, thematic, and document analysis employed in the study. The chapter aims to achieve the empirical objectives of the study, which are to determine the methods used to identify credit risks by Ghanaian Commercial Banks in agricultural finance; evaluate how Ghanaian Commercial Banks implement credit risk management policies in agricultural finance, and investigates the effectiveness of credit risk management strategies used by Ghanaian Commercial Banks in agricultural finance. On credit risk identification methods, four components were identified. The first consists of 6 items identified as the components representing the credit risk identification methods that are commonly used among commercial Banks in Ghana. They include External Audit Checks, Internal Audit Checks, Risk Management Review Process, Instance-Based method, Credit Rationing, and Credit Rating. The second component consists of four factors: the use of credit bureau reports, tax returns for self-employed borrowers, loan syndication, and the Z-score method for the identification of credit risk. The third component comprises three factors including chart-based, consultative views, and independent agency view approach. The fourth component is made up of three factors which include sensitivity analysis, credit portfolio view method, and scenario-based method. Regarding how the credit risk management policies are implemented in commercial banks, two components were identified in section 5.3.2. The first component extracted consists of ten factors representing the most commonly used policies in agricultural finance in mitigating credit risk exposure. The factors include application of loan appraisal processes, application of loan authorization procedures, application of loan approval process, credit limit review of borrowers, and

collateral requirement of borrowers among others. The second component comprises five factors involving the use of restrictive covenants, credit register, borrowers' character, credit manuals, and credit history of borrowers. About credit risk management strategies, three main components were identified. The first component extracted, loan review and documentation consists of eight factors with eigenvalue representing the most common strategies used by commercial banks to mitigate credit risk. These include regular identification of loans with distressing signals, regular review of loan granting process, and review of the loan portfolio, regular review of the credit administration process, and regular review of borrowers' credit reports among others. The second component credit skills review and monitoring contain six factors which involve a regular review of employees' credit skills, regular monitoring of collateralized transactions, regular training of credit officers, regular monitoring of borrowers' business, and loan guarantee by the Government. The third component consists of three factors including credit department's checks, identification of loans with distress signals, and regular communication of credit risk management guidelines. There is a statistically significant difference among the banks in the methods used to identify credit risk, implementation of policies, and the strategies adopted to minimize credit risk exposure.

The interview results in section 5.5 indicated that agricultural finance has myriad implementation challenges. These include poor yield, which makes the repayment of loans very difficult; lack of proper documentation to secure credit facilities; diversion of funds meant to finance agricultural activities into other areas of their choice after securing the credits; inadequate supervision of borrowers; and lack of technical units and personnel with agricultural backgrounds by some commercial banks. The last section 5.6 discussed results from document analysis. Evidence from policies discussed indicated that credit agreement policy, credit guarantee policy, training, and professional competence policy, knowing your customer policy, and risk monitoring review policy requirements have not been well implemented by commercial banks to minimize credit risk associate with agricultural lending. The document analysis further indicated little or no special attention and a lack of specific requirement considerations for agricultural finance and its associated high credit risk. The following chapter discusses the main findings from the data gathered based on existing studies and relevant theories.

CHAPTER 6

DISCUSSION OF FINDINGS

6.1 Introduction

The importance of the discussion in this section is to interpret and describe the significance and implication of the findings regarding credit risk management practices adopted by commercial banks to manage credit risk associated with agricultural lending. Factor analysis, document analysis, and in-depth interview of credit risk identification methods, implementation of credit risk management policies, and strategies adopted by commercial banks to mitigate credit risk have been performed in the previous chapter. This chapter provided a discussion of the main findings from the factor analysis and the interview results. The discussion is linked to existing studies and relevant theories. The overriding goal of all the objectives is to investigate the effectiveness of credit risk management practices of Ghanaian commercial banks on agricultural finance. Therefore, the subsequent section of this chapter discussed the findings on the methods that are used by commercial banks to identify credit risk in agricultural finance to minimize credit risk exposure. The remaining sections comprised the discussion of results on the implementation of credit risk management policies, discussion of results on strategies used by commercial banks to mitigate credit risk, significant differences among the commercial banks in credit risk management practices, and the chapter summary.

6.2 Discussion of Results on Credit Risk Identification Methods

The foremost inference of the liquidity theory of credit risk is the certainty of banks to convert assets into cash in the shortest imaginable period. Liquidity theory is strongly connected to credit risk ensuing from borrowers' defaults which affect cashflow and liquidity of banks. Largely, the theory requires banks to maintain a certain level of cash and cash equivalents for business transaction needs, to meet contingencies, and to take advantage of profitable investment opportunities. Lower liquidity impacts negatively on agricultural lending and hence the need for effective credit identification methods to successfully identify credit risk associated with agricultural lending. The reason for effective credit risk identification methods in commercial banks is to timely identify potential risk exposures and ensure that there is adequate liquidity. However, results

indicate that some of the methods proved to be effective were not frequently used to identify credit risk and other methods used do not meet credit risk management needs in improving the liquidity of the banks. The first study objective was to examine the best credit risk management methods used by commercial banks to identify credit risk in agricultural finance to improve the liquidity of the banks. In essence, commercial banks must adopt the best credit risk identification methods (Adeusi et al., 2014), to minimize credit risk exposure in agricultural finance and increase liquidity. The study established six methods or factors used by commercial banks. The most frequently used credit risk identification methods are the factors identified as external and internal audit checks. The findings concur with the liquidity theory of credit risk. This is because audit checks identify credit risk which minimizes losses and improves the liquidity of commercial banks. It further confirms the policy requirement of BoG. By the BoG policy, commercial banks are examined by an independent body to assure their financial reports, protect depositors' funds and address going concern problems. This gels with Apanga et al. (2016) in a study on credit risk management in Ghanaian listed banks who concluded that banks in Ghana consider graduating from using subjective base analysis in identifying and quantifying credit risk exposure to the use of expert and /or accounting base systems such as external and internal audit checks where key accounting variables can be combined and weighed to identify risk. While Apanga et al. (2016) based their findings on only listed commercial banks from May 2007 to October 2014, this study is the most current and involved additional information extracted from the policy documents of BoG which is the regulatory body of all commercial banks in Ghana. The findings also corroborate earlier studies conducted in Nigeria by Adamu et al. (2014) who indicated that internal audit which is an independent appraisal function and external audit which serves as the second opinion are carried out on an annual or biannual basis to identify potential credit risk in agricultural finance. Unlike Adamu et al. (2014) where the findings were based on microfinance institutions in Nigeria, this study concentrates on commercial banks whose requirements and regulations are different from microfinance institutions in Ghana. This study confirms the results of Addo (2015) who indicated in his study on audit practice and assurance in Ghana that, credit risk is most appropriately detected through audit tests and investigations before it gets out of control. Addo (2015) uses a purely quantitative, general approach that does not consider policies that guide credit risk

management in commercial banks. This study is both quantitative and qualitative and provides the means to make an adequate comparison of results from the two approaches. The findings also conform to Lagat et al. (2018) who conducted an investigation to determine the most important methods used to identify risk in Islamic banks in Kenya and found that physical inspection; financial statements analysis as well as audit checks and review are the most significant methods used to identifying risk. The findings also conform with Kumar and Kavita (2016) who indicated that credit audit procedures such as audit on the quality of loan portfolios, reporting on regulatory compliance, review of credit administration, and credit quality are the most effective tools used to identify potential credit risk in banks. The implication is that credit risk is reduced and improved liquidity for banks if audit checks are used to identify credit risk associated with agricultural lending. The finding agrees with the liquidity theory of credit risk as the approach increases liquidity and conforms with the principles of economic utility theory by choosing the best approach to identify credit risk exposure of the banks. The significance of this theory is that a decision maker must estimate the possibilities of the potential results. Agricultural endeavours in Ghana are r risky due to the methods employed. The utility theory implies that commercial banks have limited resources to achieve maximum satisfaction and they constantly have to make choices of the best methods to identify associated credit risk. The finding implies that audit checks are effectively used as a best choice to identify credit risk associated with agricultural lending and thereby minimising losses and increasing credit supply.

The study also found that an objective-based approach is a factor of the first component commonly used by commercial banks to identify credit risk in agricultural finance. The finding confirms the results of Dinu (2012) who indicated in a study conducted in Germany that the credit risk in agricultural lending can be identified easily when the objectives of commercial banks are clearly stated and understood by participants. The results also confirm the views of Osayi et al. (2019) who indicated that the correlation between credit risk, and set objectives and the likely impacts are established by the use of an objective-based approach among banks in Nigeria. The argument implies that an objective-based approach would only be effective when the objectives of commercial banks are clear, well understood with highly skilled human assets. The implication is that commercial banks

must set a clear objective regarding methods that are used to identify credit risk in agricultural finance. This agrees with the liquidity theory of credit risk and the theory of economic utility. It means that commercial banks must understand the objectives and adjust their direction for agricultural lending to minimize credit losses, improve liquidity, and motivate the banks to increase lending to the agricultural sector as a profitable business.

An instance-based approach was further identified as regularly used by commercial banks to identify credit risk. The findings conform to the results of Guo et al. (2016) who designed an instance-based credit risk assessment and identification model for the evaluation of returns and risk of each loan in Europe. It also consolidates the findings of Konovalova et al. (2016) who indicated that different types of risk identification methodologies or one methodology used with different algorithms usually does not yield similar results in the classification of loan into either 'good' or 'bad.' The ultimate recommendation is that banks must develop their risk identification methods such as the instance-based approach to quantify, measure, analyse, evaluate, monitor and control credit risk to acceptable levels of tolerance regarding the recommendations of the Basel Committee on banking supervision. This implies that the instance-based approach to credit risk identification can help banks to minimize credit risk in commercial banks and increase agricultural supply for borrowers.

The current study also found that credit rating is one of the methods in the first component that is frequently used by commercial banks to identify credit risk in agricultural finance. The findings support the views of Ubarhande and Chandani (2021) who posited that credit rating agencies should provide financial market stakeholders widely used information for effective identification and management of credit risk and also measure the credit quality of debt instruments in agricultural finance. The findings also conform to results reported by the Standard and Poor's Financial Services (SAP's, 2020) in the USA which indicated that ratings provide a measure of the comparative creditworthiness of the entity by considering a different range of factors such as environmental conditions, competitive position, quality of management, and the financial strength businesses to mitigate credit risk. The finding however does not conform to the results reported by SAP's (2020) that, a large database of borrowers and dealings in their respective business segments are not

readily available in banks and that more information on individual clients or particular transactions is usually deposited off whilst an expert judgment used to complete the picture. Notwithstanding, a very significant implication from the finding is that commercial banks use credit rating to identify credit risk in agricultural lending and has the possibility of increasing loan supply to improve performance and Cashflow of the banks and hence agrees with the liquidity theory of credit risk. The last factor identified is the risk management review process. The results confirmed the findings of Lagat et al. (2018) who investigated the most important methods used to identify risk in Islamic banks and found that physical inspection risk management review is at the forefront of methods used to identify risk in Kenya banks. The findings are not different from the opinion of Osayi et al. (2019) who indicated that regular review of the credit risk management process is a major tool used to identify credit risk among Nigerian banks. One thing that must be noted is that, unlike the current study which focused on credit risk management practices of commercial banks in agricultural finance, Lagat et al (2018) and Osayi et al. (2019) were generic in their approach with no attention on agricultural finance. Nonetheless, the finding implies that management review process is highly regarded in identifying credit risk associated with agricultural lending and hence commercial banks can adopt this approach to minimize credit risk, increase agricultural credit supply to borrowers and improve performance. This finding conform to the liquidity theory of risk as it implies that, commercial banks must use effective credit risk identification methods to identify credit risk associated with agricultural lending to minimize credit risk exposure and increase liquidity.

Subsequently, a second component identified consists of four factors. Results clarified that credit bureau reports are preferred as a second option method. The findings suggest that even though commercial banks use Credit Referencing Bureau reports (CBRs) to identify credit risk in agricultural finance, they are not the preferred components. This finding disagrees with the credit referencing theory which requires banks to constantly refer to credit bureau data for available information about borrowers to detect early warning signals before granting loans. The implication is that commercial banks cannot adequately access all information about agricultural borrowers if CBRs are not frequently used to assess agricultural borrowers in advance loans. This contradicts the credit

referencing theory which requires lenders to 'know Your Customers' (KYC) very well before credits are granted. The theory indicated that credit referencing bureaus serve as a repository of credit information that collates information of creditors' to provide banks with the credit information of borrowers to reduce credit risk exposure and that lenders must resort to the CRB to manage credit risk. This theory implies that commercial banks can access borrowers' information from third parties to make lending decisions that will minimize credit risk, maximise gains and increase Cashflow to improve the liquidity of banks. It further implies that banks must strive to access available information of borrowers through credit referencing bureaus and evaluate their creditworthiness for agricultural loans to avoid credit losses. According to Kessey (2015) in a study on credit risk management practices in the banking industry of Ghana, CRB provides lenders with adequate information regarding borrowers and provides a reliable assessment of 'KYC'. However, Kessey (2015) did not consider incorporating the policies from the Central Bank of Ghana concerning loans granted for agricultural purposes which are considered a special area. Also, the possibility of sourcing data direct from credit managers on credit risk in agricultural lending was not considered. This study very unique as it sources data from BoG and the credit officer through interviews and questionnaires. Credit bureau reports were found to be part of the second most commonly used component adopted by commercial banks in agricultural finance. Also, the results do not comply with the BoG policy requirements described in Chapter Five that, lenders must critically perform the KYC ethics before granting loans to reduce credit risk. The findings do not conform to the results of Kusi et al (2016), who indicated that the credit referencing bureau is very essential in the credit risk identification process in agricultural lending and that banks regularly use CBRs products and services to reduce information asymmetry and minimize credit risk in Ghana. The study also contradicts the findings of Brown et al. (2009) in a study on information sharing among banks in Eastern Europe, and Djankov et al. (2007) who conducted a study on information sharing among French Civil Law Countries and concluded that CBRs used by banks can minimize credit risk exposure. The findings further contradict the results of Brown et al., (2009) who in separate studies argued that all information about creditors is well-furnished and documented with more organized credit bureau institutions. The studies conducted by Brown et al., (2009) and Djankov et al., (2007) were carried out in developed countries with robust credit bureau institutions.

The interview results also established that credit referencing bureaus only provide information about the credit history of borrowers but not their financials. Most of the borrowers in the agricultural sector are not registered or do not have proper identity or information with the Credit Referencing Bureaus in Ghana. The results, however, conform to Kusi et al. (2016), who argued that Ghana is noted for poor address system, and inability to maintain very robust Credit Referencing Bureau Institutions. Thus, it is difficult to obtain relevant information of borrowers in agricultural lending in Ghana. Simply put, most borrowers' information is not kept with the few credit referencing bureaus institutions in Ghana which makes it cumbersome for commercial banks to obtain adequate information about them. This implies that CBRs are ineffective in reducing credit risk associated with agricultural finance in Ghana and hence most commercial banks do not most of the time prefer it as the first method in credit risk identification. The implication is that commercial banks that solely rely on CBRs to identify credit risk associated with agricultural lending are still likely to face credit risk challenges. This can affect the Cashflow and performance of the banks and decrease agricultural credit supply. This contradicts the adverse selection theory which indicates that knowledge-based of banks about the characteristics and behaviour of borrowers will be improved through credit information sharing among commercial banks.

The study also verified that even though commercial banks use tax returns of self-employed borrowers to identify credit risk in agricultural finance, it is not preferred in the first instance. This has the potentials of increasing credit losses and reducing the Cashflow of the banks. This contradicts with the liquidity theory of credit risk which requires banks to adopt the most appropriate methods such as tax return for self-employed borrowers to identify credit risk, improves Cashflow and increase liquidity. The findings also do not agree with Kunbuor et al. (2017) who opined that the tax returns provide details of the sources of income of borrowers in Ghana and therefore expose the repayment strength of borrowers to determine whether a particular borrower can repay a loan or not. The finding again contradicts Brick and Fung (1984) who conducted a study in New Jersey and indicated that the tax effects should be considered to compare the actual trade cost of credit with other options. The results also disconfirm the tax theory of credit risk that lenders and borrowers can be classified in different tax brackets and that

businesses in higher tax brackets advance more credit than those in low brackets of tax. This theory implies that only the lenders who are in lower tax brackets than the borrowers will accept credit terms as those in higher brackets of tax can cheaply borrow more and directly from commercial banks. This finding implies that the inadequate use of the tax returns for self-employed borrowers to identify credit risk associated with agricultural lending will make it practically difficult for commercial banks to classify small and large borrowers to evaluate their repayment strength. It means therefore that, loans will not only be lost and reduce the Cashflow of the banks but will also significantly reduce agricultural credit supply. It must be noted however that, most small-scale agricultural borrowers never file their taxes (Kunbuor, Ali-Nakyea & Demitia, 2017) and this serves as a weakness of the tax returns theory.

Even though Z-score is used by commercial banks to identify credit risk in agricultural finance similar to Huang (2018) in a study on Chinese commercial banks as a mathematical model that identifies the possibility of credit risk, it was not commonly applied in the first instance. In the current study, the Z-score model was identified as part of the second most frequently used component in identifying credit risk in agricultural finance. The results conform to the findings of Tandon and Batra (2014) who indicated that there are challenges in using the Z-score to assess credit risk in Indian banks. The findings also contradict the results of Bandyopadhyay (2016) who indicated that banks and investors in emerging economies such as India are likely to get early warning signals about borrowers' solvency status by using the Z-score model in identifying credit risk reconsider the magnitude of default premium required on securities that have a low grade. Unlike Bandyopadhyay (2016), whose study was based on the probability of default on Indian corporate bonds, the current study strictly deals with credit risk management practices of Ghanaian commercial banks in agricultural finance. The finding implies that the Z-score method of credit risk identification is not too effective in minimising credit risk among Ghanaian commercial banks and can possibly affect commercial banks in the volume of agricultural credit supply and agricultural borrowers in terms of the volume of agricultural credits they receive.

Additionally, the study also identified a third component consisting of three factors as methods used by commercial banks to identify credit risk in agricultural lending. The

chart-based method is used by commercial banks to identify credit risk in agricultural finance. Commercial banks do not most of the time use the chart-based approach to identify credit risk in agricultural finance. The finding disagrees with the liquidity theory and does not follow the opinion of Huang (2018) in a study on credit risk identification in Chinese commercial banks and indicated that charts enable risk managers to identify areas of risk concentration, and establish participants with high authority who supervise the effective implementation of risk management strategies. However, the risk identification strategy highlighted by Huang (2018) in his study was based on real estate development which is different from this study that is centred on agricultural finance. The results of the current study also contradict the findings of Kozodoi et al. (2019) who opined that a chart-based approach identifies bottlenecks, and determines a critical path in planning, identifying, and prioritizing credit risk. The implication is that the chart-based techniques used by Ghanaian commercial banks for the analysis of loan products, dependency analysis, site analysis, loan decision analysis, critical path analysis to identify credit risk associated with agricultural lending have not been very effective. It means that chart-based credit risk identification will shorten the performance of banks and affects agricultural credit supply to borrowers.

The study found that commercial banks adopt the use of consultative views from third parties and expert judgment as a third option method to identify credit risk in agricultural lending. This implies that commercial banks do not commonly use consultative views from third parties and independent agency reviews as methods of identifying credit risk in agricultural finance. The findings do not support the OECD (2019) reports which pointed out that, Consultative views from third parties and independent agency reviews of borrowers' creditworthiness are critical in mitigating credit risk exposure, particularly in agricultural lending. The findings also contradict the liquidity theory of risk and the results of the Bank of England (BoE, 2019) which reported that information gathering from independent agencies such as independent research providers, and civil organizations which includes NGOs, affected groups and key stakeholders are necessary for identifying credit risk by commercial banks in agricultural finance. In contradiction to the findings of Indra (2015) who considered expert judgment as the best tool used in Nepal to predict events likely to occur in the future concerning the identification of credit risk, findings from

the current study indicate that expert judgment is not a commonly used in Ghanaian commercial banks to identify credit risks in agricultural finance. The findings imply that, some credit risk identification methods considered to be useful in identifying credit risk exposure of the banks regarding agricultural lending have not been fully utilised by Ghanaian commercial banks.

The fourth component is identified to consist of three factors considered by commercial banks to identify credit risk in finance agriculture. These include sensitivity analysis, credit portfolio view method, and scenario-based approach. The findings revealed that sensitivity analysis, credit portfolio view method, and scenario-based approach are the least used factors by Ghanaian commercial banks to identify credit risk in agricultural finance. The implication is that either these methods are not very effective or banks have not fully adopted some of the recommended methods that are used to identify credit risk associated with agricultural lending and hence does not agree with the economic utility theory. The findings disagree with the liquidity theory of credit risk since Cashflow of the banks will be affected if the appropriate credit risk identification methods are not used. The findings also contradict Nwude and Okeke (2018) who pointed out that, risk exposure of banks is determined by underlying risk factor volatilities and banks' portfolio sensitivity to the movements in those factors of risk among Nigerian banks. The current study which posited that sensitivity analysis is not a factor most commonly used by commercial banks as a method of identifying credit risk in agricultural finance also contradicts the findings of Amadhila and Ikhid (2016) in their study conducted in Namibia and Maraux (2010) who argued that credit analysts highly welcome sensitivity analysis without stimulation to speed up computation in credit risk identification considered by the authors as a simple method used to assess the impacts of the correlation shift in advanced countries such as the US and UK. The findings do not also conform to Ferrari et al. (2021) who attested that the sensitivity of banks' credit risk is determined by technical considerations such as data availability, loan losses, defaults, and reserves for loan losses in Belgium and does not conform to the liquidity theory of risk. In the same vein, the study does not follow Rao et al. (2020) who argued that commercial banks can use the volatility of credit spreads, loan losses, and defaults to estimate the sensitivity of the intensity of credit at risk encountered by the banks in agricultural finance. By implication, a lack of examining the sensitivity and

trend analysis of loans as potential credit risk identification method might result in faulty and risky decisions. This can lead to loan losses, reduction in performance and affect the Cashflow of commercial banks. In the long run, agricultural borrowers will be hit with inadequate credit supply resulting from Cashflow challenges the banks.

The study also found that commercial banks do not frequently use the credit portfolio view methods to identify credit risk in agricultural finance. The result of the study is inconsistent with the liquidity theory of credit risk which emphasized banks to hold more cash by regularly using approaches that minimize credit risk and increase Cashflow. It also contradicts the recommendations of BoG (2018) which indicated that banks must regularly review their portfolios as part of the credit risk management practice. The results do contradict Abbas et al. (2018) who argued that the credit portfolio view adopts the transitional matrix approach to identify risk among banks in Pakistan. Further, the findings do not support the views of Allen and Powell (2011) who pointed out that the credit portfolio view approach provides normal relevant values that can be used to identify credit risk among banks in Australia. An important implication is that commercial banks will not be able to evaluate good and bad portfolios to inform in lending decisions since the credit portfolio view approach is not effectively used to identify credit risk in agricultural lending. This could worsen the credit risk management problems, reduce the Cashflow of banks, create liquidity problems, and affects credit supply to agricultural borrowers.

The use of the scenario analysis approach was also ranked a fourth option factor in identifying credit risk. The results imply that commercial banks do not commonly use scenario analysis to identify credit risk in agricultural finance and this finding conforms to the findings of Kattel (2015) who posit that, even though some banks use the scenario base approach as a credit risk identification technique in the identification of credit risk in commercial banks, some other banks in Nepal do not embrace the approach. The finding however contradicts the findings of Caruso et al. (2021) and Indra (2015) who postulated that risk identification methods should involve stress test scenarios to ensure that key weaknesses of the organizations involved are tested and that commercial banks should maintain sufficient capital and liquidity to strategically tailor scenarios to their risk profiles to appropriately manage credit risks. The findings also do not conform to the Basel II committee and IMF (2014) recommendations which stressed the use of both quantitative

and qualitative standard methods such as stress testing and scenario analysis to identify credit risk.

The interview results indicated that commercial banks must consider the expertise of credit officers and the purpose for which the loans are requested before extending credits to borrowers involved in the agricultural value chain. Lastly, the interview results suggested that commercial banks consider some factors before granting loans for agricultural purposes. These include the capabilities of management, the experience of agricultural borrowers, the expertise of credit officers, the type of agribusiness, borrowers' history, collateral requirements, credit guarantee schemes, and borrowers' Cashflow. Others include the location of agribusiness, cost of operation, purpose of the loan, weather conditions, and existing market. Following the Economic Utility Theory, it can be concluded that market participants such as commercial banks seek to satisfy their interests to achieve maximum benefits which are referred to as profit or utility. Commercial banks have limited funding resources to achieve maximum satisfaction. The significant implication is that commercial banks must constantly make good choices to identify credit risk associated with agricultural lending and how to effectively manage loans granted to generate adequate Cashflow and reduce credit losses. However, some of the most frequently recommended methods such as the portfolio view approach have not been effectively adopted by the commercial banks. By implication, credit risks can be measured and managed only if they are appropriately identified. Put another way, if commercial banks do not use the appropriate credit risk identification methods, credit risk is not adequately measured. Another implication from the results is that some of the credit risk identification methods such as sensitivity analysis, scenario-based approach, chart-based, independent agency review approach and consultative views from third parties do not meet commercial banks' credit risk management needs in agricultural finance.

6.3 Discussion of Results on the Implementation of Credit Risk Management Policies in Agricultural Finance

The second study objective was to examine how credit risk management policies are implemented in commercial banks. Commercial banks must adopt the best policies to minimize credit risk exposure in agricultural finance. To achieve this objective, three approaches were adopted namely the PCA using questionnaire data, thematic analysis using in-depth interviews, and policy document analysis from BoG. These approaches were adopted to provide holistic information to supplement each other regarding credit risk management practices of commercial banks in agricultural lending. It must be noted that information from policy documents from BoG and interviews could not be obtained using the questionnaire. The findings are discussed in two sections. The study first discusses the results of the quantitative data which is followed by a discussion of the results of the qualitative data.

The first component identified in the study consist of ten factors considered by commercial banks during the implementation process in agricultural finance. Findings from the quantitative data indicate that the application of the loan appraisal process is commonly applied by commercial banks in agricultural finance in mitigating the effects of credit risk exposure. The finding agrees with Muriithi et al. (2016) who carried out a study on the effect of credit risk on the financial performance of commercial banks in Kenya and indicated that commercial banks must have sufficiently clear credit appraisal policies and lending guidelines that must be applied to minimize credit risk. The finding also confirms the recommendation of Kessey (2015) who conducted a study on credit risk management practices in the banking industry of Ghana and recommended banks adopt comprehensive credit appraisal policies to mitigate credit risk. The results of the study are also similar to Dlugosch et al. (2018) who proposed that loan appraisal guidelines must be well communicated and that every staff involved in the credit risk management process is obliged to thoroughly understand and appraise loans to enhance proper implementation of laid down policies and procedures among commercial banks in Kenya. This has a significant implication that the implementation of the loan appraisal process in Ghanaian commercial banks to minimize credit risk exposure in agricultural lending is effective. This is good for the banks because it identifies at an early stage, risky threats that could be

avoided. By implication, effective loan appraisal increases loan recovery and improves the liquidity position of the banks. This conforms to the liquidity theory of credit risk, which requires banks to hold a large number of liquid assets against possible demands. The finding further gels with the credit reverencing theory which requires banks to conduct a comprehensive appraisal of loans considering all available information about borrowers to minimize credit risk exposure. The core objective of effective implementation of credit risk management policies in commercial banks is to ensure that there is adequate liquidity for transactional purposes, speculative and precautionary demands for money. Put another way, higher liquidity increases the performance of commercial banks and the credit supply to agricultural borrowers.

The study also found that the application of loan authorisation procedures was identified as one commonly used by commercial banks in agricultural finance. The in-depth interview results confirm the quantitative results. The results of the interview gathered from all the participants indicated that loan requests from borrowers are appropriately passed through relevant approval and authorisation procedures where a credit paper is generated and if the request is approved, the borrower is asked to fulfill all pre-disbursement conditions before the loan is finally disbursed. The results of the study confirm the findings of Afande (2014) who posited that authorisation procedures should be followed by banks before granting loans to borrowers to minimise risk exposure and that loan approval, appraisal, and authorisation procedures should be regularly reviewed to mitigate credit risk exposure. It also resonates with the credit referencing theory since all information about borrowers will be appraised before an authorisation is granted. This will minimize credit risk and improves banks' liquidity and hence conform to the liquidity theory of risk. The finding also supports the views of BoG (2020) which indicated that there must be a regular review of all authorization processes such as credit limit of borrowers' repayment capacity of borrowers, borrowers' business progress before granting credits to borrowers, and Mokatsanyane et al. (2017) who argued that there should be, securitization of borrowers, before granting credit as a result of the high risk associated with the agricultural sector. The results also conform to the findings of Afriyie et al. (2018), who posited that lending decisions that are not properly approved, appraised, or authorized most likely result in a high default rate in commercial banks

leading to high credit risk exposure in commercial banks. The finding implies that loan authorisation and approval processes are effectively implemented by commercial banks in agricultural lending, meaning that credit risk can be minimized using this approach. By extension, loan losses are prevented thereby increasing the cashflow of the banks in conformance with the liquidity theory of risk already discussed and increasing credit supply to agricultural borrowers.

Further, the credit limit review of borrowers was identified as one commonly used by commercial banks in agricultural finance. This study result confirms Meutia, Adam, & Vegirawati (2018) who posited that establishing credit limits on individuals or groups of associated counterparties is critical in managing credit losses in agricultural finance. The findings further confirm the views of Lang and Jagtiani (2010) who attested that credit limits are necessary for all the activities of commercial banks that post potential credit risk. The result, however, contradicts De-Ramon, & Straughan (2020) who argued that cut-off on lending impedes the funding need of businesses particularly agricultural which calls for more finance and interventions to survive. The finding of De-Ramon, & Straughan (2020) could be subjected to further investigation considering that agricultural lending is a risky business calling for a sensitive extension of loans to borrowers who cannot repay. Nevertheless, the findings imply that Ghanaian commercial banks generally implement effective credit limit review policy during the credit risk management process to minimize credit risk exposure in agricultural lending. This is in line with the liquidity theory of credit risk as it leads to avoidance of credit losses, increases the performance of banks and credit supply to agricultural borrowers.

The study also found that commercial banks consider the collateral requirement of borrowers before granting credits. This proposition conforms to the interview results which found security requirement as one of the factors used factors considered by commercial banks in granting loans for agricultural purposes. The interview results further indicate that uncollateralized loans are very risky and commercial banks might suffer losses when borrowers default in repayment. The finding also reflects the views of Corradin, Heider, and Hoerova (2017) and Olowa and Olowa (2017) who posited that because commercial banks do not know the possible hidden information about the quality of borrowers who may change their attitude after receiving loans leading to high default, commercial banks

must require collateral before granting loans. This agrees with the credit referencing theory. The finding also confirms the results of Mokatsanyane, Muzindutsi, and Viljoen (2017) who stressed that collateral offers some level of security for borrowers who fail to repay their loans and Odonkor (2018) who posited that, loan officers must consider the liquidity, quality of collateral and the value ration of collateral before the approval of loans among Ghanaian banks. The findings, however, do not agree with the results of Jiménez, Salas and Saurina (2009) who opined that the likelihood of default is high in loans with collateral than those loans which do not have collateral supporting their loans. However, the Borrowers and Lenders Act, 2008 (Act 773) discussed in the policy document review of chapter five indicated that lenders do not have an effective way of searching for charges on properties that have been offered for credit to assure whether the charged property used as collateral is genuinely the bona fide property of borrowers as a result of endless litigations. The finding implies that, even though commercial banks effectively implement the collateral requirement policy in granting credits for agricultural activities, more efforts should be applied to investigate the bonafide owner of property used as collateral to secure agricultural loans. Simply put, genuine collateral is significant in minimizing credit losses and improving Cashflow. This encourages banks to increase lending support to agricultural borrowers. The finding further implies that commercial banks should only consider advancing credits for agricultural purposes to borrowers with reliable collateral to minimize loan losses. This accounts for the reason why the credit reverencing theory used in this study becomes very relevant.

Insurance of loans was also identified as one of the factors used by commercial banks in the credit risk management policy process in agricultural finance. This result confirms the findings of Odonkor (2018) who postulated insurance as a strategy which commercial banks can use to mitigate future credit losses. The findings further conform to the views of Dlugosch et al. (2018) who argued in a study conducted in Kenya that suggested that loan losses would be minimized particularly by commercial banks through insurance. This agrees with the liquidity theory as loan insurance in agricultural lending reduces losses and increases the liquidity position of commercial banks.

In furtherance, the quantitative results also indicate that commercial banks most commonly assess the capacity of borrowers in granting credit for agricultural activities.

This finding agrees with the credit referencing theory that available information requirement enhances the banks access to ascertain the capacity of borrowers to determine whether or not agricultural borrowers can repay loans with interest. The findings also confirm the results of Menkhoff et al. (2006) who indicated the capacity of borrowers as one of the major factors for the evaluation and granting of loans by Thai commercial banks to minimize losses. It also conforms to a study conducted by Wanjohi (2016) among commercial banks in Kenya, and Noman, Hossain, and Pervin (2015) on local private commercial banks in Bangladesh who indicated that borrowers should be appropriately assessed to determine their capacity to minimize loan losses. This is significant for the banks because it reduces loan defaults resulting from bad loans and increasing Cashflow, meaning that commercial banks would be encouraged to provide more funding for the agricultural sector for borrowers who have the capacity to repay loans. In addition, it was found that commercial banks commonly review the credit disbursement processes in agricultural finance to mitigating the effects of credit losses. This result confirms the findings of Derban et al. (2005) in a study on community development financial institutions in the UK who concluded that the credit disbursement review process should be regularly reviewed and modified to mitigate credit risk challenges. The result further confirms Lagat et al. (2018) who indicated that the credit disbursement process should be regularly reviewed and modified to reflect current challenges to prevent loan losses and that the review actions depend on the terms and conditions associated with the disbursement of loans. This implies that credit disbursement review processes are effectively implemented by Ghanaian commercial banks in agricultural lending. This impacts positively on agricultural lending since it improves the Cashflow of the banks and increasing funding supports for agricultural lending.

Furthermore, the study disclosed that commercial banks comply with the relevant laws and regulations to mitigate credit risk exposure in agricultural finance. The findings of the study conform to the guidelines reported by BoG (2019) that, it would be practically difficult if not impossible to create the infrastructure of credit reporting to reduce the credit risk exposure of commercial banks in the absence of an effective regulatory framework and environment. The results also conform to the banking regulations indicated by the

Banks and Specialised Deposit-Taking Institutions Act, 2016, Act 930 detailed in Chapter 5 that Commercial banks in Ghana are required to comply with the regulations and guidelines. The results also support the reports of IFC (2018) and the views of Afriyie et al. (2018) indicating the existence of strict adherence to internal credit policies and loan administration procedures requiring reasonable due care during credit risk identification credit assessment, credit approval process, credit evaluation, credit risk policy implementation procedures and the best strategies to mitigate credit risk exposure in agricultural finance among banks in Ghana. This implies that commercial banks effectively comply with relevant laws and regulations in the implementation of credit risk management policies to minimize credit risk associated with agricultural lending. This has the advantage of reducing credit risk exposure to an acceptable level and increase banks' profitability.

The second component in the quantitative study consists of five factors. Even though commercial banks consider the enforcement of restrictive covenants of borrowers, they are not commonly preferred in the first instance. Restrictive covenants are considered as the second option during the credit risk management policy implantation process. The findings do not conform to the BoG policy requirement that banks must reach a solid agreement with borrows and strictly apply it to minimize credit losses. The result does not also conform to Addae-Korankye (2014) who carried out a study on the causes of loan defaults among micro-financial institutions in Ghana and posited that borrowers should be bonded to effectively minimize credit risk exposure in agricultural finance. Whilst Addae-Korankye (2014) concentrated on microfinance institutions, this study concentrates on commercial banks in Ghana. The findings do not support Addae et al., (2014) who found that effective credit risk management requires commercial banks to effectively enforce all restrictive covenants arranged with the borrowers. The point is that borrowers should be made to sign bonds of good behaviour when accessing credit for agricultural activities, and use the credit for the purpose for which they are granted. The findings also contradict the views of Odonkor (2018) who claimed that banks mostly use restrictive covenants as a strategy to reduce credit losses ensures possibilities of regular repayment of loans. Odonkor (2018) only concentrated on rural banks as compared to this current study where the focus is on commercial banks. The results, however, support

Odonkor (2018) who argues that enforcement of restrictive covenants is only effective when the lenders are very few and that, in the existence of many lenders where borrowers can easily switch presence, strict regulations are not effectively enforced. The findings do not also follow the collateral registry rule described in chapter five. By the Collateral Registry by Bank of Ghana under the Borrowers, and Lenders Act, 2008, (Act 773) and BoG (2020) described in chapter five, there must be a written agreement between the lenders and borrowers which contains details of the amount of credit involved, date of the agreement, repayment method, repayment amount and the purpose for which the loan was contracted, which banks must critically adopt to reduce credit risk. This implies some commercial has not fully implemented the use of restrictive covenant policy in granting agricultural credits to borrowers. This can lead to loan losses and reduces the number of credits granted provided for agricultural borrowers.

The assessment of the Credit Register is considered a secondary factor of the credit risk implementation process in agricultural finance as demonstrated in this study. The finding does not agree with the credit referencing theory which stressed effective assessment of all available information about borrowers before granting loans. Besides, the result slightly varies with the reports of IMF (2014) that commercial banks should keep a credit risk register which represents the main output of the credit risk identification exercise. The finding does not also conform to the BoG report that the register directs the commercial banks' main focus to prioritize risks as it contains the possibility of risk occurrence and the likelihood of impacts BoG (2020). It also contradicts the BoG (2020) policy that the credit risk register contains all detailed and comprehensive information on all the risks of commercial banks and should be regularly updated to identify credit risk exposure. The finding implies that commercial banks have not completely adopted the use of credit risk register assessment as a policy for managing credit risk associated with agricultural lending. Ineffective use of credit risk register will make it difficult to measure and assess credit risk to prevent credit losses. This has a chance of reducing Cashflow of the banks and reducing agricultural credit supply.

The use of credit manuals by commercial banks in the credit risk management policy implementation process was also found as a secondary factor considered by commercial banks in agricultural finance. This does not follow the BoG requirement of effective

enforcement of policies to minimize credit risk associated with lending. This implies that commercial banks do not commonly use the credit manual as the first option during the credit risk management policy implementation process in mitigating credit risk exposure. The findings do not conform to the banking sector reports BoG (2020) where commercial banks are recommended to develop comprehensive credit risk management manuals to address liabilities and assets management as a risk mitigation strategy to minimize credit risk exposure. The result does not also conform to the findings of Abbas et al. (2018) who argued that banks should develop and use credit manuals to ensure consistency in credit decisions and ease lending processes to effectively mitigate credit risk exposure. However, the study results conform to the findings of Otwori (2013) who argued that mere comprehensive adherence of credit manuals in the distribution of credit is not enough to mitigate credit risk, particularly in agricultural finance in Kenyan banks. Notwithstanding, the finding implies that the credit manual policy has not been effectively implemented by commercial banks to minimize credit risk in agricultural lending. This can lead to loan losses and affects the ability of commercial banks to finance agricultural activities.

Character and credit history of borrowers were also identified as some of the secondary factors considered by commercial banks in agricultural finance. The finding does not agree with the credit referencing theory. The theory stressed the need to evaluate all information credit history of borrowers before granting loans to minimize credit risk exposure. This implies that the character and credit history of borrowers are not commonly used by Ghanaian commercial banks in agricultural finance. The results of the quantitative data further contradict the findings of Menkhoff et al. (2006) who argued in a study carried among Thai commercial banks that the character credit history of borrowers must be considered lending to reduce credit risk exposure. The quantitative results do not also conform to the findings Wanjohi (2016) in a study carried out on credit risk management among commercial banks in Kenya and Noman et al. (2015) who conducted a study on private local private commercial banks in Bangladesh and argued that borrowers' character affects repayment of loans and must be considered bank banks in granting credits. This finding implies that assessment of the character and credit history policy has not been effectively implemented by commercial banks. This will affect the

Cashflows of the banks and make it difficult to advance more credits to the agricultural sector.

The in-depth interview which was conducted to probe participants on the implementation of credit risk management policies further pointed out some challenges encountered by commercial banks in agricultural finance. The interview results indicate that commercial banks have implementation challenges in agricultural finance as a result of the high risk associated with the sector. Following, one of the challenges encountered in the implementation of credit risk management policies is poor yield experienced by agricultural borrowers resulting in loan repayment problems. Adding, some farmers who can achieve bumper harvest do not have storage facilities and a ready market to sell their produce to repay their loans. This is because a majority of borrowers such as farmers are in the rural areas and do not have adequate storage facilities to store their produces after bumper harvest. Because some of these products are perishable, they are mostly disposed of at cheaper prices to advantage buyers. The challenge is that; they are unable to sustain Cashflow to repay their loans. This will force commercial banks to relax in granting loans for agricultural purposes.

Inadequate agricultural infrastructure such as irrigation processes and processing facilities was identified as a major challenge. This usually results in losses and creates loan repayment problems. Adding, commercial banks become reluctant in giving loans to farmers, as the recovery of loans is strictly difficult. It was stated by some participants that; commercial banks prefer to grant loans to salary workers than for agricultural purposes. It was argued that loan recovery from salary workers is very cheap as compared to agricultural borrowers which are very risky. It was also found that some borrowers do not keep proper books of accounts and necessary documentation which makes it difficult for credit officers who have to visit borrowers' businesses for instance farms at the fields as the only basis for the drafting of the credit papers. Because most borrowers such as farmers do not have proper documentation on their farmlands, it is difficult for them to use such land as collateral security to secure loans for agricultural purposes. The interview results also indicate that diversion of funds is common among agricultural borrowers. It was found that borrowers divert their loans into different areas other than agricultural purposes as soon as the loans. This makes monitoring of loans

granted for agricultural purposes difficult and posing implementation challenges. It was further found that some borrowers seek to avoid the credit officers from commercial banks who do onsite visits to ensure the loan is used for the purpose in which it was granted. This aggravates the difficulties of appropriately monitoring the performance of such loans. Also, the importation of cheaper agricultural produce is making the local production of Agric products unattractive and uncompetitive. Besides, the underdeveloped export market makes it difficult for borrowers in the agricultural value chain to generate more income from the international market to improve their Cashflow. These findings imply that Cashflows of borrowers would be affected and hence repayment. This has some implications on the adverse selection theory propounded by Stiglitz and Weiss (1981) which underpinned that, lenders cannot differentiate between the appetite of borrowers and risk levels and that credit contracts are subject to limitations. This means that, were the debt responsibilities of agricultural borrowers are more than their Cashflow they cannot repay loans with interest out of their pockets (Ahlin & Waters, 2016). This assertion postulates that borrowers will pay back loans if they have the means to do so and therefore does not extend to those who willingly default (Guttman, 2008). The limited liability of borrowers signals commercial banks to critically conduct due diligence works before advancing credits to agricultural borrowers in the agricultural value chain finance to avoid bearing all the credit risk associated with agricultural lending.

Most agricultural borrowers do not have all the requirements for an agricultural credit facility. Getting approval for such a request is most stressful. It was also revealed that some of the commercial banks do not have dedicated and specialized units or officers purposely uncharged of agricultural finance even though agricultural finance is a specialized area that must be given the needed attention. It was cited that, there is not much attention given to the agricultural sector considering the importance of the sector and its associated high risk. The interview results also found a lack of insurance schemes in the agricultural sector, unlike the other sectors. Even though the farmhouses are insured the animals, farms and the produces are not insured, making it challenging for commercial banks to confidently finance agriculture, as the risk involved is very high. However, the implication of section 93 of the Banks, and Specialised Deposit-Taking Institutions Act, 2016 (Act 930) described in chapter five, suggests that Bank of Ghana

cannot assess and measure possibilities of credit risk exposure such as non-performing, and impaired loans if the weekly, quarterly, and annual reports provided by the commercial banks are defective and fall short of facts. This will make monitoring and supervision difficult for the Banking Supervision Department of the Bank of Ghana to ensure compliance and minimize possible credit losses and hence reduce agricultural credit supply.

6.4 Discussion of Results on Credit Risk Mitigation Strategies

The last objective of the study was to determine the possible best strategies that could be used by commercial banks to reduce credit risk exposure in agricultural finance BoG (BoG, 2019; Khalid & Amjad, 2012). To achieve this objective, data were collected using PCA and thematic questionnaires and interviews and analysed using PCA and thematic analysis. The questionnaires were designed to ascertain the strategies used by commercial banks to mitigate credit risk in agricultural finance whilst the interview was designed to probe participants for views on best strategies for commercial banks to minimize credit risk associated with agricultural finance in Ghana. The subsequent discussion incorporates the findings from the questionnaire data and the in-depth interview results.

The most frequently used strategies are the factors identified as part of the first components adopted to mitigate credit risk. Results from the questionnaire data indicate that identification of loans with distress signals and portfolio quality of loans are strategies frequently used by commercial banks to mitigate credit risk in agricultural finance. This finding resonates with the liquidity theory of credit risk which requires banks to identify loans with distress signals and manage them to improve the quality of the entire portfolio to reduce loan losses and improves the liquidity of the banks. The findings confirmed the results of Owojori et al. (2011) in a study conducted on the challenges of risk management in Nigerian banks in the post-consolidation era. In the same study, the major cause of the distress of the liquidated banks was the inability to identify loans with bad signals. The results further support the view of Khalid and Amjad (2012) who argued that the inability to identify loans with potential credit weaknesses culminates in bad loans and impair repayment. The results again indicate that the portfolio quality of loans is frequently considered by commercial banks in agricultural lending. This is consistent with Philippon

(2015) in a study on the US finance industry and Kimotho and Gekara (2016) on the effects of credit risk management on Kenyan commercial banks. Both studies ultimately argue that the assessment of portfolio quality of loans and review of borrowers, credit reports are critical in discovering possible problem loans. These studies also confirm the findings of Rufo and John (2017) who conducted a study on the effect of credit risk and capital adequacy on the profitability of rural banks in the Philippines established that the overall quality of the loan portfolio should be assessed in a timely basis to identify loans with bad signals. However, Rufo and John (2017) centered their findings on rural banks whilst the findings of the current study are based on commercial banks in Ghana. The results are also consistent with Addae-Korankye (2014) who postulated that portfolio quality, effective loan evaluation, and continuous supervision can avoid the agonies and frustrations of bad loans. Hence commercial banks must actively monitor all the loan granting processes in finance agriculture to ensure early detection of distressed loans. The quantitative results align with the interview findings which confirmed that agricultural finance needs regular monitoring and supervision by commercial banks to reduce credit losses. The finding implies that identification of loan distress signals adopted by commercial banks to mitigate credit risk has been effectively implemented. This will prevent loans from going bad, improves Cashflow and enhance adequate credit supply to the agricultural sector. It was also found that the review of the loan granting process was identified as one of the most frequently adopted by commercial banks to mitigate credit risk exposure in agricultural lending. The findings support the position of Muriithi et al. (2016) who carried out a study on the effect of credit risk on the performance of commercial banks in Kenya and established approval policies and processes for the granting of loans as highly recommended to mitigate credit risk in agricultural finance. The results further confirm those of Asongo and Adamu (2014) who posited in a study on microfinance companies in Nigeria that, loan granting processes should be regularly reviewed. They also established that irregular credit risk assessment and analysis by management could cause default problems. These results also confirm the interview suggestions in this study.

Similarly, a regular review of the credit administration process was identified as one of the most commonly used strategies adopted by commercial banks in agricultural finance.

The findings ratify the results of Funso et al. (2012) who posited that banks must build up their capacity in credit appraisal and administration in Nigeria. The results are also consistent with Tandon and Batra (2014) who indicated that strict adherence to internal credit policies, and loan administration procedures help to reduce credit risk exposure. The findings further confirm the results of Doriana (2016) and Tomak (2013) who posited that the impact of credit risk resulting from credit losses can be reduced greatly if banks adopt effective and reliable loan administration procedures to reduce losses. The findings imply that a review of loan granting and administration processes have been effectively implemented by commercial banks to mitigate credit risk associated with agricultural lending. This means that, Cashflow of the banks can be improved effectively in line with the liquidity theory of risk which encourages banks to maintain certain level of cash and cash equivalents for business transaction needs, to meet contingencies and to take advantage of profitable investment opportunities. This could motivate banks in increasing credit supply to agricultural borrowers.

Further, a review of borrowers' performance and credit reports were identified as another most commonly used strategy adopted by commercial banks in agricultural finance. This finding agrees with the adverse selection theory which indicates that borrowers cannot repay loans and interest out of their pocket and that review of borrowers' performance and credit reports are very critical in mitigating credit losses. The quantitative results are in conformance with the interview results which indicated that commercial banks should review the performance of borrowers' businesses on regular basis to reduce credit risk. The findings conform to the results of Afriyie (2018) who indicated regular review of borrowers' performance and credit reports, as part of the best strategies that can be used by commercial banks to mitigate credit risk exposure of banks. The results also follow the opinion of Dlugosch et al. (2018) in a study on credit risk management among commercial banks in Kenya and Philippon (2015) who attested that effective screening and appraisal of borrowers' performance and credit reports are necessary for mitigating credit risk exposure of banks. Olowa and Olowa (2017) indicated in a study carried out among Nigerian banks that, regular review of borrowers' performance and credit reports would provide early signal information regarding borrowers, and those who do not have sound and solid financial position are classified as unstable and are likely to default in repayment

of borrowed funds. The result implies that; commercial banks have effectively adopted reviewing the performance of borrowers as well as credit reports as one of the most significant strategies to mitigate credit risk in agricultural lending. This has a positive implication for commercial banks and the borrowers since it improves the Cashflow of the banks and is likely to increase agricultural lending support. In addition, the study found proper documentation of all credit-related transactions as one of the most frequently used credit risk mitigation strategies in agricultural finance. These results confirm the findings of Philippon (2015) on the US financial industry and Olowa and Olowa (2017) who indicated that an effective banking system ensures repayment of loans by borrowers through proper documentation of credit-related transactions to reduce credit losses among Nigerian banks. The finding also agrees with the liquidity theory of credit risk. The finding implies that commercial banks properly document all credit-related transactions as a strategy frequently used to mitigate credit risk in agricultural lending. This means this strategy is effective in reducing credit losses. Reduction in credit losses increases Cashflow and performance of the banks and provides a strong motivation for banks to increase agricultural lending without fear of credit loss threat.

The second most frequently used strategy by commercial banks in agricultural finance to mitigate credit risk exposure are the factors identified as part of the second component (credit skill review and monitoring). The results indicated that regular review of employees' credit skills and regular training of credit officers were identified as the second most preferred strategies adopted by commercial banks in agricultural finance in Ghana. The results imply that regular review of employees' credit skills and training of credit officers are not most frequently preferred in the first instance as part of the strategies in credit risk mitigation and this finding does not follow the requirement of BoG which emphasized on banks to have professional training and professional development of credit officers to mitigate credit risk. By the study results, they are second options adopted after the first strategic options are used and do not agree with the liquidity theory of credit risk. This is because, if the credit skills of credit officers and monitoring are not effective, the possibility of credit losses associated with agricultural lending is high and can affect the liquidity positions of the banks. The result of the quantitative data conforms to the findings of the interview results which indicated that most commercial banks do not

regularly consider the qualification and technical training background and skills of credit officers before appointment as most of them are trained on the job. The results do not conform to the findings of Harelimana (2017) who highlighted the impact of risk management on Tanzanian banks and argued that regular training is given to credit officers to enable them to develop professionally and deliver better service quality to reduce credit risk exposure. The author's opinion is however confirmed by the interview results. The quantitative results of this study also contradict the findings of Addae-Korankye (2014) who argued that well experienced and trained staff be engaged by banks as credit officers in Ghanaian commercial banks and that, the skills of individual credit officers are reviewed for regular training needs to mitigate credit risk exposure confirmed by the interview results. The results of the quantitative data do not also follow the Boguslauskas and Mileris (2009) who stated that strategic plans must focus critical attention on the development, and training of key credit officers of banks in Lithuania and supported by Khalid and Amjad (2012) that lack of experienced and trained loan officers can create problems in the recovery of loans among Islamic banks in Pakistan. The study findings also contradict the proposition of Amadhila and Ikhide (2016) in a study on agricultural finance in Namibia, Dexu and Wenlong (2016) who argued that credit officers be regularly trained on credits, loan recovery policies, and administration to minimize credit risk in agricultural lending. Furthermore, interview results indicated that even though commercial banks consider experience and training on the job for credit officers either as the second or first instance strategy, the fields of study of credit officers are not considered in the appointment. Commercial banks appoint credit officers from different fields of study such as Sociology, Science, Accounting, Psychology, or Finance. The problem most frequently encountered spans from the fact that the officers with backgrounds other than agricultural are likely to lack technical expertise, unlike the credit officers with an agricultural background who already acquired the knowledge tree on agriculture indicated by the interview results. The interview results further indicated that commercial banks must set up technical units purposely in charge of agricultural finance and managed by technical people with an agricultural training background in order to mitigate credit risk. The in-depth interview results further indicate that government should recruit graduates from agricultural training institutions for all district to provide

players in the agricultural value chain finance get regular technical and expert advice in order to effectively manage credit risk in agricultural finance.

Regular monitoring of collateralized transactions was also identified as part of the second most preferred strategy adopted by commercial banks in agricultural finance. The findings do not conform to the results of Ollennu (1962) and Daum and Birner (2017a) who posited that all collateralized transactions and joined ownership equipment be regularly monitored to mitigate against credit risk. The results also disagree with the adverse selection theory. This is because where the debt responsibility of agricultural borrowers re more than their Cashflow, they cannot repay loans with interest if collateralized transactions are not effectively monitored to recover losses. The results also deviated slightly from the opinion of Mokatsanyane et al. (2017) who identified securitization as a major credit risk management strategy and Olowa and Olowa (2017) who indicated regular monitoring of collateralized transactions to ensure effective recovery of loans. The finding implies that commercial banks have not been effective in monitoring collateralized transactions to improve loan repayment and reduce credit risk associated with agricultural lending. This has the potential of increasing loan defaults which affects Cashflows in commercial banks and can practically reduce lending to agricultural sector.

Monitoring of risk management practices and review of borrowers' business was identified as another second preferred strategy used by commercial banks to manage credit risk in agricultural finance. This finding does not agree with the adverse selection theory because borrowers will only repay loans if they have the means to do so. If monitoring of risk management practices and regular review of borrowers' business is misplaced loan losses will be high. The results of this study do not follow the findings of Afande (2014) who discovered that credit risk management practices of commercial banks must include regular review and monitoring of management practices to mitigate credit risk in Kenya. The results also contradict the findings of Noman et al. (2015) indicated regular monitoring of management practices such as loans and reminders given to borrowers when principal and interest remain unpaid for a particular period. The result is also not in conformance with the views of Nwude and Okeke (2018) who argued that monitoring of credit risk management practices should be seen as a regular process involving risk identification, assessment of the likelihood of impact, and taking significant steps to

minimise credit risk exposure. The possible reason for monitoring as a second resort was captured by the interview results which indicated that, there is high monitoring cost in agricultural finance and that it is difficult for commercial banks to get credit officers in all the regions who can monitor the performance of borrowers as a result of the scattered nature of borrowers across Ghana. The high monitoring cost is aggravated because an attempt by commercial banks to get risk officers in all branches to monitor borrowers would be very expensive and less prudent. This affects the number of credits granted to agricultural borrowers.

As part of the second component, a loan guarantee scheme was identified as one of the secondary strategies used by commercial banks to mitigate the effects of credit risks in agricultural finance. The quantitative result is confirmed by the interview findings that commercial banks do not consider credit guarantee as a first option strategy in credit risk mitigation in agricultural finance. The interview results revealed further that, small-scale agricultural borrowers who do not have collateral, could only access loans from commercial banks if they belong to an association that can provide a guarantee. The results imply that credit guarantee schemes have not been effectively used by commercial banks to mitigate credit risk in agricultural lending. The results did not follow the Credit Guarantee Policy indicated by the bank of Ghana where banks are to request borrowers to provide collateral security or guarantors as part of the credit agreements before loans are granted by commercial banks stipulated by the Borrowers, and Lenders Act, 2008, (Act 773). Following, guarantors are required to provide a guarantee for credits to protect commercial banks against possible credit losses and this guideline instituted by the banking supervision department of BoG must be implemented by lenders. However, the guidelines instituted were general and not specific for agricultural purposes indicated in chapter five. In addition, the results did not support the findings of Wubin et al. (2020) who considered regular use of credit guarantee schemes as one of the best strategies used to mitigate credit risk and Noman (2015) who argued that banks must give more attention to third-party guarantees to reduce credit risk and prevent losses resulting from credit risk exposure. The findings also contradict the view that, by regular use of credit guarantee schemes, credit associations and government who usually serve guarantors in the facilitation of the loans to borrowers would pay off lenders a significant part of the

loan in default cases (Yoshino & Taghizadeh-Hesary, 2018). The results did not also follow the argument that banks can cooperate with other entities such as DANIDA through credit guarantee schemes to minimize credit risk associated with agricultural finance in Ghana (Daum & Birner, 2017a, 2017b). An important implication of this finding is that inadequate use of credit guarantee schemes will not only reduce loan recovery rate but will most importantly reduce the level of agricultural credit supply to agricultural borrowers.

The third most frequently used strategies used by commercial banks in agricultural finance to minimize credit risk are the factors that are identified as part of the third component (Credit Department Checks). It implies that commercial banks adopt these strategies only if the factors identified in the first and second components are exhausted. Results indicate that checks by the credit department for the repayment of loans on time and identification of loans with potential credit weakness that can cause repayment problems have been identified as some of the strategies in the third component adopted by commercial banks in mitigating credit risk in agricultural. This disagrees with the adverse selection theory which stressed regular checks for repayment as a good strategy in minimizing loan losses. This finding does not also support the position of Philippon (2015) who posited that borrowers are regularly checked by the credit department for the repayment of loans on time and identify loans with potential credit weaknesses that might cause problems in loan repayment. The findings did not also support the views of Rufo and John (2017) who recommended regular checks and assessment of the overall quality of the loan portfolio and timely identification of loans with bad signals to minimize credit losses. The findings further contradict the proposition of Kimotho and Gekara (2016) who indicated that regular checks and identification of loans with credit weakness are critical in the assessment of portfolio quality to mitigate credit risk in agricultural finance. The finding implies that credit department checks as a strategy adopted to mitigate credit risk in agricultural finance have been weekly applied. This can reduce loan recovery which affects the Cashflow of the banks which eventually reduces agricultural credit supply.

Communication of credit risk management guidelines was identified as one of the factors considered as a third option strategy in commercial banks for minimizing credit risk in agricultural finance. The results of the study did not align with the findings of Romanova (2012) who posted that risk management guidelines should be communicated to all

individuals involved in the risk management process to mitigate credit risk. The finding does not agree with credit referencing theory which emphasized effective information sharing through effective communication of credit risk to mitigate credit risk exposure of banks. This is because information sharing on credit risk mitigation cannot be complete without first communicating the nature of credit risk faced by banks regarding agricultural lending. The results also vary with the views of Khalid and Amjad (2012) who opined that key players in the credit risk management process should regularly provide reliable information, and timely portfolio quality information to risk officers to plan against the adverse effect of credit losses. This implies that communication of credit risk management guidelines as a strategy to mitigate credit risk exposure in agricultural lending was ineffective. This negatively affects the lending decisions of commercial banks regarding agricultural lending. There were some other strategies pointed out during the in-depth interview as part of the best that can be used by commercial banks to mitigate credit risk in agricultural finance. The interview results suggested that commercial banks should collaborate with incentive-based risk-sharing systems such as the Ghana Incentive-Based Risk-Sharing System for Agricultural Lending Projects (GIRSAL) to mitigate credit risk in agricultural finance. A bank that follows the process is given loans given a seventy percent guarantee cover by GIRSAL to mitigate credit risk. In this case, the government pays the loan when borrowers default. This suggestion conforms to the opinion of Muhammad et al. (2018) who indicated that banks must collaborate with risk-sharing systems to serve as an incentive to reduce credit risk. The interview results further support the adverse selection theory highlighted in chapter two that, lenders cannot differentiate between borrowers' appetites and risk levels. Therefore, since credit contracts are subject to limitations, where the debt responsibilities are more than proceeds from the project, borrowers do not have the responsibility to make repayment from their own pockets. As a result, commercial banks must consider collaborating with incentive-based risk-sharing systems to mitigate the effects of credit risk exposure in agricultural finance.

Additionally, the interview results suggested that commercial banks should collaborate with international bodies to identify and access a cheaper and long-term source of funding for the agricultural value chain finance. This suggests that commercial banks should collaborate with funding bodies and partners such as the Ghana Exim Bank (GEB),

African Development Bank, and the Agence Française de Développement, to secure cheaper funding for agricultural purposes mitigate the effects of credit risk exposure. The interview results further suggested commercial banks make use of the Ghana Agricultural Insurance Pool which provides insurance against possible loan losses. Group project funding is required and this source of funding is better because commercial banks which do not meet long-term agricultural finance needs would not contemplate locking up funds on long-term projects particularly rubber finance which takes about 5 to 10 years to yield and generate Cashflow. The interview results also found the need for the government's intervention in the provision of inputs to farmers and subsidizing of loans for players in the agricultural value chain to minimize loan repayment problems and reduces credit risk. Similarly, it was also recommended that commercial banks must adopt a value chain finance approach in agricultural finance to effectively manage credit risk to an acceptable level of tolerance. The interview results indicated that, by value chain finance, commercial banks should finance borrowers involved in the agricultural sector. For instance, in crop farming, the bank should consider finance beginning from the provision of inputs and then up to when the products are finally sold to boost the Cashflow of borrowers and reduce credit losses resulting from bad loans.

Following, interview results also suggested that commercial banks must assist and encourage borrowers in the agricultural value chain finance to collaborate with off-takers to secure the already market to generate enough Cashflow and minimize credit losses. This finding agrees with the adverse selection of theory. Put in another way, collaboration with Off-takes will improve the Cashflow of agricultural borrowers and improve their affordability and capacity to repay loans with interest willingly. One of the strategies that were also suggested was the restructuring of loans by commercial banks and releasing the loans in trenches by considering the performance of borrowers regarding the purpose for which the loans were granted. It was also found that commercial banks must have to invest more in knowing their customers to avoid loans being granted to regular bad borrowers in agricultural finance. As pointed out by the interview results, agriculture is a highly specialized area that needs special attention and investment to develop to effectively reduce credit risk resulting from bad loans in agricultural finance.

6.5 Discussion of Differences between the Commercial Banks' Credit Risk Identification Methods, Management Policies, and Mitigation Strategies

The significance of discussing the differences between the commercial banks' credit risk identification methods, implementation of credit risk management policies, and credit risk mitigation strategies in this section cannot be underestimated. Importantly, it provides a detailed evaluation of the variations between the banks and their implications on credit risk management practices in agricultural lending. The ANOVA and MANOVA results on the analysis of differences for credit risk identification method indicated that some of the credit risk identification methods used by commercial banks are bank-specific. For audit checks, the p-value of the F-statistics is greater than the 0.05 (5%) conventional level of significance and hence implies no difference across the 4 banks. This implies there are no variations among the commercial banks in their use of audit checks to identify credit risk associated with agricultural lending. This finding complies with the BoG policy requires that all banks are expected to adopt the use of professionals such as professional auditors to assure the reliability of reports generated to identify credit risk. The results also confirmed the findings of Apanga et al. (2016) who evaluated credit risk management among Ghanaian listed banks and indicated that banks must consider the use of expert services such as external and internal audit checks where key accounting variables can be combined and weighed to identify risk. The finding of Apanga et al. (2016) is not different from Addo (2015). This implies that audit checks will reduce lending risk increases Cashflow of the banks and encourage banks to grant more agricultural credit to borrowers. Adding the p-values of the F-distribution for Reports and Z-score; Agency and Consultative views; and Analysis method are less than the 0.05 (5%) level of significance. This implies that there are differences in the mean score of items regarding Reports and Z-score; Agency and Consultative views; and Analysis method adopted by commercial banks to identify credit risk in agricultural lending. This difference is expected considering the quantitative results which indicated that commercial banks least used Reports and Z-score; Agency and Consultative views; and Analysis Method to identify credit risk in the agricultural ending. Though Moradi and Rafiei (2019) confirmed in an evaluation of dynamic risk model in Iranian with data mining techniques and found that, the reports and Z-score model was used to detect early warning signals about the solvency of agricultural borrowers to mitigate credit risk exposure not all commercial

banks in Ghana have fully embraced its application. Similarly, Adekunle et al. (2020) and Indra (2015) found consultative views to be effective in identifying credit but this seemed different among Ghanaian commercial banks. Similarly, Razman and Safian (2019) evaluated debt recovery practices among Islamic banks in Malaysia using content analysis and agency review to be effective in identifying credit risk. It was also found that some banks exhibited more credit risk identification methods than others. Using the ANOVA in this study, the F-statistics examines whether or not the variations between the group means are larger than the variance of the observations within the group. The resulting ratios, are adequately large suggesting that all the means are not equal and this justifies the significance of using the ANOVA. And the MANOVA

The ANOVA also evaluated the implementation of credit risk management policies in agricultural finance among the banks. For “compliance, insurance and creditworthiness, the p-value of the F-statistics is less than the 0.05 (5%) conventional significant level. This implies that compliance, insurance, and creditworthiness differ across the 4 commercial banks in the implementation of their credit risk management policies. This is possibly not good for the banks since compliance, insurance and creditworthiness are critical assessment facets during the credit risk implementation process and the requirement by BoG to strictly implement such policies to minimise credit risk. The results, therefore, do not conform to Monye et al. (2020) who evaluated the credit reporting Act 2017 in Nigeria employing the descriptive and explanatory approach and found that all banks must comply with internal guidelines, laws, and regulations strengthened credit reporting systems and thwart credit risk exposure. This was identified as increasing the cashflow of the banks and would therefore increase lending to the agricultural sector. With regards to restrictions and the history of borrowers, the p-value of the F-distribution is greater than the significant level of 5 percent indicating that no significant difference mean score of items across the banks exists. This means that there is no difference in the mean score of items among the 4 banks regarding restrictions and history of borrowers in their credit risk management implementation process. Kessey (2015) and Gouri, and Mahajan (2017) identified restrictions as significant in the credit risk implementation process to significantly minimise credit risk. However, evidence from the quantitative analysis in section 5.3.3 indicates that commercial banks have not effectively implemented this

policy. No doubt that commercial banks have not universally implemented this policy in the credit risk management implementation process indicated by the ANOVA results. For all the banks however, the F-statistics are suitably large signifying that there are no equal means among the banks.

The ANOVA results also evaluated the difference among commercial banks in some of the strategies used by the banks in agricultural finance. For loan review and proper documentation, the p-value of the F-statistics is higher than the 0.05 (5%) level of significance indicating that the null hypothesis of no difference between the mean score of items is valid. The conclusion inferred here is that loan review and proper documentation do not vary across banks. Commercial banks are expected to adopt the loan review and proper documentation strategy to effectively mitigate credit risk exposure of the banks to minimize credit losses in agricultural finance. This would improve the cashflow of the banks and increase agricultural credit to the borrowers. The ANOVA results, therefore, conform to Olowa and Olowa (2017) who used a Tobit regression to evaluate the factors influencing loan repayment in Nigeria and found loan review and proper documentation to be a very significant strategy in mitigating credit risk. The result is also in line with Sackey (2018) who used the probit model in a study to assess discrimination against the agricultural sector in credit rationing behaviour of Ghanaian commercial banks and found that monitoring and proper documentation were very effective in mitigating credit risk in agricultural finance. Regarding credit skills review and monitoring, the p-value of the F-test is lower than the conventional significance level of 0.05 (5%) showing that credit skills review and monitoring differ across the 4 commercial banks. It implies that there is a statistically significant difference in credit risk mitigation strategies among the banks in terms of credit skills review and monitoring. The results do not conform to the findings of Harelimana (2017) who evaluated the impact of risk management on Tanzanian banks and found credit skills review and regular monitoring as one of the best strategies to mitigate credit risk exposure. Reduction in credit risk exposure is likely to increase the performance of banks and the likelihood of an increase in agricultural credit supply to borrowers. However, quantitative results in section 5.5.5 revealed that, commercial banks have not fully adopted this strategy to mitigate credit risk exposure. It is usually preferred as a second options strategy. This provides the basis to

predict that, there would likely be differences in the score mean of items regarding credit skills review and monitoring among the commercial banks in the application of their credit risk mitigation strategies. Also, the p-values of F-statistics for credit department checks indicated that the credit department checks do not vary across banks. The findings are in line with Rufo and John (2017) who indicated that credit department checks must be used by all banks to significantly mitigate credit risk. However, evidence from the quantitative analysis in section 5.5.5 postulates that Ghanaian commercial banks have not effectively implemented this strategy. Notwithstanding, the variation across the banks is justified considering the different nature of operations and activities of these banks which might require different approaches in each bank's context. Regardless of the differences across the banks' credit department checks must be vigorous to minimize credit losses, improve the Cashflows of the banks and increase agricultural credit supply. From these results, it is clear that variations are appropriately significant. This implies that all the means are not equal and affirms the significant levels of the ANOVA and MANOVA tests.

6.6 Chapter Summary

The chapter presented detailed findings of the study resulting from the policy review, quantitative and in-depth interview data. With regards to the methods used by commercial banks to identify credit risk in agricultural finance, audit checks, objective-based, credit rationing, instance-based, credit rating, risk management review process, and cashflow of borrowers were identified as frequently used by the banks to identify credit risk. Some of the credit risk identification methods do not meet commercial banks' credit risk management needs in agricultural finance. The findings also show that commercial banks must use the appropriate credit risk identification methods to measure and manage credit risk. In terms of the implementation of credit risk management policies, application of loan appraisal process, authorisation and approval process, credit limit review, collateral requirement, loan insurance, assessment of the capacity of borrowers, application and review of credit disbursement process, and compliance with relevant and regulatory requirements were regularly used by commercial banks in agricultural finance to mitigate against credit risk exposure. Apart from the irregular enforcement of restrictive covenants, assessment of credit register, assessment of borrowers' character, use of credit manuals, and assessment of borrowers' credit history during the implementation process,

commercial banks also encountered some implementation challenges. Some include poor bookkeeping on the part of borrowers, lack of insurance for agricultural produces, lack of collateral by borrowers, poor yield affecting cashflow, underdeveloped export market, and no adequate attention on the agricultural sector as a result of the high risk associated with the sector.

The study also found that identification of loans with distress signals, review of portfolio quality of loans, review of loan granting process, review of the credit administration process, review of borrowers' performance and credit reports, proper documentation of credit are some of the best strategies in reducing credit losses in agricultural lending. The study further recommended commercial banks collaborate with international bodies to identify cheaper long-term sources of funding for agriculture, collaborate with incentive-based risk-sharing systems, establish technical units purposely in charge of agricultural finance, seek government intervention in agricultural finance, adopt a holistic agricultural value chain finance, make use of the Ghana Agricultural Insurance Pool to minimise credit risk. The study found that some of the factors used by commercial banks in the credit risk identification methods such as Audit checks and Credit Rating", "Reports and Z-score" and "Agency and Consultative Views are bank-specific. Also, in the implementation of credit risk management policies such as compliance, insurance, borrowers' creditworthiness, and restrictions, and the history of borrowers are bank-specific. Similarly, some of the strategies such as loan review and proper documentation; loan review, and proper documentary and credit department checks used by commercial banks to mitigate credit risk exposure are bank-specific. The final chapter offers a concise summary, conclusion, and recommendations for further study.

CHAPTER 7

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This study investigated the effects of credit risk management practices of commercial banks in the finance of agriculture in Ghana. Agricultural is the most sensitive sector sustaining the livelihood of individuals and must be given the necessary special attention regarding funding. However, the agricultural sector finance in Ghana has been challenging as a result of the high credit risk associated with the sector. Despite the high credit risk associated with the sector, commercial banks have, over the years, adopted credit risk management practices that are inadequate to minimize credit risk in agricultural finance. This has resulted in banks failing to provide adequate funding. Even though all Ghanaian commercial banks have credit risk management policies and credit risk departments that are expected to manage credit risk associated with agricultural lending to an acceptable level of tolerance, credit risk management in agricultural lending remains an emerging troubling issue among these commercial banks. This sparked an interest to investigate the effects of credit risk management practices of Ghanaian commercial banks concerning agricultural finance. This study established the suitable methods of identifying credit risks, effective ways of implementing credit risk management policies, and the best strategies in mitigating credit risk to promote agricultural lending as a viable business. It also provides useful information to policymakers and regulators on the need to thoroughly monitor commercial banks, specifically in the area of the implementation of risk management policies. This could bolster the management of credit risk associated with agricultural lending. The study investigated the methods used by commercial banks in identifying credit risks, the effectiveness of the implementation of credit risk management policies, and the effectiveness of strategies used to mitigate credit risk in agricultural finance.

The study is structured into 7 chapters. This terminal chapter is structured into 5 sections. Section 7.1 provides the background introduction, section 7.2 summarises the study, section 7.3 offers the conclusion, section 7.4 highlights the contributions and implications

of the study, the penultimate section 7.4 focuses on the limitations and the ultimate section 7.6 proffers suggestions for future studies.

7.2 Summary of the Study

The study is structured into 7 chapters namely the introduction (chapter 1); theoretical literature review (chapter 2); empirical literature review (chapter 3); data and methodology (chapter 4); data analysis and interpretation and documents analysis (chapter 5); discussion of findings (chapter 6); and summary, conclusions, and recommendations (chapter 7).

Chapter one highlighted the background to and motivation for the study based on the objectives provided on credit risk management practices adopted by commercial banks to reduce credit risk exposure in agricultural finance. This initial chapter carves space for determining the appropriate credit risk identification methods, effective implementation of credit risk management policies, and determining the best strategies for commercial banks to reduce credit risk in agricultural finance.

Chapter two provides the theoretical foundation upon which the current study was laid. The first was the economic utility theory which posits that individuals and entities have limited resources, and to achieve total satisfaction, they constantly need to make choices with the limited resources on how to reduce costs and maximise benefits. Ghanaian commercial banks must therefore prudently select alternatives that offer the highest utility and minimise credit risk associated with agricultural lending. The second was the liquidity theory of credit risk. This theory requires banks to maintain certain cash levels and cash equivalents for their operations for them to meet contingencies, and also undertake viable investment opportunities. The theory recommends that banks ought to increase cashflows and hold an adequate amount of liquid assets against possible demand in the face of unforeseen circumstances. Thirdly, the tax theory of credit risk is based on the ability to access more sources. The theory classifies lenders and borrowers into different tax brackets in assessing sources of finance in which they have different borrowing costs. Therefore, businesses in higher tax brackets advance more credit than those in low tax brackets. The fourth is the Adverse Selection Theory which also assumes that when the debt obligation of borrowers exceeds the cashflow, borrowers have no obligation to repay

loans out of their own pockets. The limited liability assertion of borrowers signals that commercial banks must extensively exercise their due diligence before loans are granted to borrowers in the agricultural value chains. The last was the Credit Referencing Theory which provides the basis for commercial banks to adequately assess and know the history of their customers before granting credit. By seeking references from other parties, credit register assessment, and evaluating legislative requirements to gain information on individuals responsible for managing counterparty risks, commercial banks strive to ascertain the creditworthiness of borrowers in the agricultural value chain and mitigate credit risk exposure of the banks in the finance thereof.

Chapter three provides a review of the empirical literature on credit risk identification methods, effective implementation of credit risk management policies, and the strategies used by commercial banks in agricultural finance. This is also the foundational basis for the objectives pursued in this study. The literature confirmed that some of the methods used to identify credit risk are not appropriate and inadequate for that purpose. Findings further suggest that commercial banks encounter challenges in the implementation of credit risk management policies. These results further suggest that commercial banks must adopt the best credit risk management strategies to minimize such risk. Lastly, available literature indicates that there are limited empirical studies on credit risk management practices of commercial banks, especially in agricultural finance in African regions.

Chapter four describes the methodology and the empirical models used to achieve the study objectives. The Principal Component Analysis of the exploratory factor analysis model was employed to determine and assess the factors most frequently used by commercial banks in credit risk identification, implementation of credit risk management policies, and the strategies adopted by commercial banks to minimize credit risk exposure of banks in agricultural finance. This chapter also explored alternative views emerging from thematic analysis which generated five themes regarding credit risk management practices of commercial banks for discussion.

The data is analysed and interpreted in Chapter five. The analysis involved both quantitative data generated through the questionnaire and the in-depth interview.

Principal Component Analysis was used to reduce the variables of the quantitative data into components for analysis whilst the thematic approach generated themes from the comments of participants from an in-depth interview for analysis and discussion. Chapter five also provides an in-depth review of policy documents relating to credit risk established by BoG. Some of the policies reviewed include the policies on Credit Agreement, Credit Guarantee, Training, and Professional Competency of staff, Reporting Requirement of banks, Examination, and Investigation, Knowing Your Customers, Minimum Capital Requirement, and Risk Monitoring. The available policy documents verified that there is no specific policy regarding credit risk management practices in agricultural finance even though this is a special area calling for urgent attention. The study further indicated the need for borrowers and lenders to reach a consensus on contracts before loans are advanced. The available documents insist on regular examination, and supervision of commercial banks by the Bank of Ghana to minimize credit risk. The use of professionals such as Lawyers and qualified Accountants was recommended for the objective conduct of an independent examination and investigation.

In chapter six, the findings of the study are presented and discussed. The chapter presents a detailed discussion of the main findings resulting from credit risk identification methods, effective implementation of credit risk management policies, and strategies used to mitigate credit risk in agricultural finance whilst making references to policy requirements of the Bank of Ghana. Whilst audit checks, objective-based credit rationing, instance-based credit rating, risk management review process, and cashflow of borrowers have been identified as methods frequently used by commercial banks to identify credit risk in agricultural finance, it was established that some of the credit risk identification methods do not meet credit risk management needs, particularly where agricultural finance is key. The findings imply that commercial banks must adopt appropriate credit risk identification methods in agricultural finance to minimize credit risk to an acceptable level of tolerance. Results further verified that even though commercial banks regularly adopt factors such as application of loan appraisal process, authorisation and approval process, credit limit review, collateral requirement, loan insurance, assessment of the capacity of borrowers, application and review of credit disbursement process, and compliance with relevant and regulatory requirements for the implementation of credit risk

management policies in agricultural lending, they are, however, challenged in the implementation process. The challenges were identified as poor bookkeeping on the part of borrowers, lack of insurance for agricultural produce, lack of collateral by borrowers, poor yield affecting the cashflow of borrowers, underdeveloped export market, and inadequate attention on the agricultural sector as a result of the high risk associated with it. Also, identification of loans with distress signals, review of portfolio quality of loans, review of loan granting process, review of the credit administration process, review of borrowers' performance and credit reports, proper documentation of credit were identified as some of the best strategies identified by commercial banks in minimizing credit losses in agricultural finance. Further, the chapter recommended commercial banks to collaborate with international bodies to attract cheaper long-term funding to finance agriculture. Banks were also exhorted to collaborate with incentive-based risk-sharing systems, set up technical units comprising individuals with a training background in agriculture purposely in charge of agricultural finance, seek government intervention, adopt a holistic agricultural value chain finance and collaborate with Ghana Agricultural Insurance Pool to minimize credit losses.

7.3 Conclusions

Findings from the survey data and in-depth interview confirmed that commercial banks adopt the use of audit checks, objective-based, credit rationing, instance-based, credit rating, risk management review process, and cashflow of borrowers as methods to identify credit risk in agricultural finance. It was further ratified that whilst some of the risk identification methods do not meet commercial banks' credit risk management needs, the banks do not regularly use some of the widely recommended methods to minimize credit risk exposure. These results imply that commercial banks do not regularly use the portfolio view approach as part of the best methods. The evidence further confirmed that credit bureau reports are not regularly used by commercial banks as recommended by Basel Committee's submissions on Banking Supervision and Ghanaian Credit Reporting Act, 2007 (Act 726) to effectively manage credit risk. Because of the poor utilization of these components, banks are therefore unable to maintain very robust Credit Referencing Bureau Institutions in Ghana. It is practically difficult for commercial banks to obtain adequate information about agricultural borrowers to make lending decisions.

Further, the study also found the application of loan appraisal process, authorisation and approval process, credit limit review, collateral requirement, loan insurance, assessment of the capacity of borrowers, application and review of credit disbursement process, and compliance with relevant and regulatory requirements are the most regularly used credit risk implementation strategies. It was further established that commercial banks are confronted with several challenges in the implementation of credit risk management policies. Quantitative results indicate that restrictive covenants, assessment of credit register, assessment of the character of borrowers, use of credit manuals, and assessment of the credit history of borrowers before granting credits are not regularly enforced by commercial banks. Interview results further indicate that improper and poor bookkeeping by agricultural borrowers, lack of insurance for agricultural produce, lack of collateral by borrowers, poor yield leading to inadequate cashflow, underdeveloped export market, and inadequate attention on the agricultural sector finance were some of the major challenges in agricultural finance.

The interview results further confirmed that there is no specialised unit comprising technical people with an agricultural background in most of the commercial banks to appropriately manage credits relating to agricultural finance. Further, the review of policy documents indicated that there is no specific or specialised policy on agricultural finance established by the Bank of Ghana for commercial banks. This is although agriculture is the foundation of the Ghanaian economy, calling for special attention. Interview results further established that most borrowers do not register their information with credit referencing bureaus in Ghana for commercial banks to obtain reliable information about them. It emerged that most borrowers do not even have the collateral to request credit from commercial banks for agricultural purposes. This essentially means that commercial banks would have to contemplate and carry out due diligence checks to avoid credit risk. Some borrowers divert agricultural credit secured for other purposes and ends that are not in line with the application. It was intriguing to confirm that some borrowers diverted the loans secured from the commercial banks to avoid credit officers and therefore making supervision and monitoring complex.

In furtherance, identification of loans with distress signals, review of portfolio quality of loans, review of loan granting process, review of the credit administration process, review

or borrowers' performance and credit reports, proper documentation of credit represents the most commonly used strategies identified by commercial banks to reduce credit losses in agricultural lending. Quantitative results established that employees' skills, collateralized transactions, risk management practices, loan repayment, and communication of credit risk management guidelines are not regularly reviewed and monitored in agricultural finance.

The study recommends that commercial banks collaborate with international funding bodies and partners such as the Ghana Exim Bank, African Development Bank, and Agencé Française de Développement to identify cheaper long-term sources of funding agricultural activities. There must be an urgent collaboration with incentive-based risk-sharing systems such as the GIRSA. Equally, there is a need for technical units which should be managed by technical people with an agricultural background. This could be in addition to seeking governments intervention in agricultural finance and adopting a holistic agricultural value chain finance. These prospects could be enabled through collaboration with Ghana Agricultural Insurance Pool to mitigate credit risk associated with agricultural finance. Results also suggest that commercial banks could assist borrowers to collaborate with off-takers²⁴ to secure already a market that generates enough cashflow and reduce credit losses. Interview results from participants further consolidated the point that commercial banks must restructure loans extended to farmers and release credit in tranches when they have fully considered the performance of borrowers and the purpose for which the loans are advanced. Additionally, commercial banks must encourage borrowers to register all available information with credit bureau institutions. Banks could thus invest more in knowing their borrowers' credit history and business performance. Such intimate knowledge reduces credit risk exposure resulting from poor lending practices. The study verified that some of the factors used by commercial banks as credit risk management practices are bank-specific.

²⁴ Off-Takers are the buyers who come to terms with farmers to produce goods and directly supply to them at a price agreed as per the terms indicated in the agreement between the two parties (Interview Results).

7.4 Contributions and Implications

This study contributes to the existing literature on credit risk management practices of commercial banks in agricultural finance. First, the study unveils the appropriate methods of identifying credit risks in agricultural finance in commercial banks in mitigating credit risk exposure. It subsequently shows that commercial banks can deal with credit risk only when they are appropriately identified. Secondly, the study provides empirical evidence on the implementation of credit risk management policies. It shows that effective implementation of credit risk management policies by commercial banks in agricultural finance is the best practice for mitigating credit risk exposure effects. Thirdly, the study provides a guide in building the capacity of staff of commercial banks and sustainable practices that could significantly reduce credit risks. Fourthly, this study also informs policy regulators such as BoG of the need to closely monitor commercial banks on the implementation of risk management policies to ensure compliance and mitigate credit risk exposure in agricultural finance. In addition, the study identifies the applicable best strategies that could be used by commercial banks to mitigate credit risk in agricultural finance and to promote agricultural lending as a viable business. Lastly, given that the agricultural system is already under pressure to satisfy current demand, the study informs the need to invest in sustainable technologies and climate-smart agriculture as the only way to increase food production and cashflow of farmers. These kinds of investments would enable farmers to produce more food with less of an environmental impact and minimises credit losses. Wise investments could also help keep food prices lower and promote economic growth.

The findings from the study have implications for banking practice, theory and credit portfolio managers, risk analysts, policymakers/regulators, and academics in the finance profession. The study identifies weak banking practices in agricultural finance. Findings indicate that some of the methods used to identify credit risk in agricultural finance do not meet commercial banks' credit risk management needs. Some methods that have been tried and tested effective in minimizing credit risk are not frequently used by commercial banks. For instance, the use of consultative views from third parties and expert judgment, and the use of credit bureau reports are not regularly adopted by commercial banks to identify credit risk in agricultural lending

There are a few challenges associated with agricultural finance in commercial banks which include irregular enforcement of restrictive covenants, irregular assessment of credit register, irregular assessment of borrowers' character, irregular use of credit manuals, and irregular assessment of borrowers' credit history during the loan implementation process. It was established that poor bookkeeping on the part of borrowers, lack of insurance for agricultural produces, lack of collateral by borrowers, poor yield leading to inadequate cashflow, underdeveloped export market, and inadequate focus on the agricultural sector due to high risk associated with the sector are significant hurdles affecting the sectoral risks. The findings imply that commercial banks might have good policies but these are not effectively implemented. When good policies are not implemented by the banks, the problems associated with loan repayment aggravate the credit risk exposure in agricultural lending. It further implies that commercial banks might have supervision and monitoring challenges in the implementation of credit risk management policies. The larger import is that commercial banks must adopt the best credit risk policy implementation strategies to mitigate credit risk in agricultural finance. Commercial banks must also consider collaboration with local and international funding bodies to finance or incentive-based risk-sharing systems to mitigate credit risk effects in agricultural finance.

It was also observed that investors are rational and risk-averse and would always want to maximise gains at any level of risk. Further, the adverse selection theory assumes that lenders cannot differentiate between risk levels and borrowers' appetite and that credit contracts are subject to limitations. It implies that borrowers do not have any responsibility to repay loans out of their pocket where the debt responsibilities are more than the project proceeds. This provides a strong warning signal to commercial banks. These banks have to gather more information about borrowers through the exchange of credit information among commercial banks. Banks need to know about the behavior and character of borrowers in the agricultural finance value chain. This also implies that the information asymmetry would be reduced through the information sharing among commercial banks as suggested by the credit referencing theory. This obviously minimises the probability of providing loans to serial defaulters. Essentially, commercial banks must conduct due diligence before credit is granted to borrowers. The findings further imply for academics,

scholars, and policy think-tanks that there exist significant differences among commercial banks in their credit risk management practices. Essentially showing that credit risk management practices of commercial banks in agricultural finance are bank-specific.

Evidence from the Bank of Ghana policy documents review indicates the Credit Guarantee Policy stresses the need to secure lending through credit guarantee or collateral. This implies that commercial banks must require a credit guarantee or collateral from borrowers in agricultural lending. However, the policy only prefers a few lenders with a large base of assets to afford credit. However, with regards to Ghana where most agricultural borrowers fall within the small, and medium agricultural enterprises, most are unable to meet the requirements to secure credit with collateral for agricultural purposes. Further, the Bank of Ghana also emphasises that commercial banks need to know their customers through information sharing before granting credit. This policy, however, has some loopholes, especially with Ghana being noted for poor address systems, and lack of robust credit bureau institutions where all information about borrowers remains untapped. It was further verified that there is no policy regarding credit risk management specifically tailored for agricultural finance.

7.5 Policy Recommendations

The findings from the analysis of BoG policy documents provide useful information for regulators and policymakers such as the government, BoG, and banks to pay special attention to agricultural finance considering that this sector remains the main pillar of the Ghanaian economy. First, there is the need for the BoG to draft a policy specifically regulating agricultural finance and credit risk management associated with the sector because agriculture is the foundation of the Ghanaian economy and needs special attention. The agricultural sector should be supported with refined policy and implementation documents against the reality of borrowers' inability to honour loan contracts. Through the envisaged new policy, BoG could specify concessions such as interest rate rebates, tax holidays (in consultation with Ghana Revenue Authority), for commercial banks who grant credits to borrowers in the agricultural value chain. This would reduce the credit risk exposure of the banks and encourage commercial banks to lend to the agricultural sector as a viable business. Second, BoG must effectively and regularly supervise and monitor commercial banks in their agricultural lending activities

as well as provide expert advice on how to minimize credit risk associated with agricultural lending. This is because BoG can develop robust credit risk management policies but if commercial banks poorly implement these due to inadequate supervision and monitoring by BoG, credit risk management problems could continue to persist in commercial banks. Third, the government must establish more credit guarantee schemes and incentive-based risk-sharing systems for small, and medium agricultural enterprises. Through these schemes, borrowers in the agricultural value chain finance would improve their cash position and repay their loans to minimize credit losses in commercial banks. Forth, there is the need for government to establish a very robust address system in Ghana to make it easy for commercial banks to capture all information about borrowers. Fifth, BoG must consider establishing robust credit referencing bureau institutions such that all borrowers' credit history is captured. This could then be subsequently assessed by commercial banks before granting loans for agricultural purposes to reduce credit risk. Sixth, BoG should establish detailed credit agreement policy guidelines specifically for commercial banks with special considerations regarding agricultural lending. This policy should be exclusively for the agricultural sector considering the special nature of the sector. There is also the need for BoG to make it a requirement for all commercial banks to maintain proper books of accounts regarding agricultural lending, well supervised and monitored by the Banking Supervision Department of BoG to minimize possible credit losses. This policy must incorporate regular reports on agricultural lending and its associated credit risk as part of BoG prudential requirements for commercial banks. Lastly, BoG should come out with a detailed policy regarding credit risk management, particularly in agricultural finance considering that, agriculture is regarded as the foundation of the Ghanaian economy (MoFA, 2020), and needs special attention. In this policy, BoG should make it obligatory for all commercial banks to establish technical units that facilitate the administration and recovery of loans meant for agricultural finance.

7.6 Limitations of the Study

Even though the study achieved its objectives, the thesis has some limitations. It must be noted that these limitations do not affect the validity of the conclusions drawn. Firstly, the study assesses the effectiveness of credit risk management practices of four commercial banks in agricultural finance. There are twenty-three commercial banks in Ghana at the

time of this study that could have provided similar information. However, the banks selected are good enough to provide relevant information regarding the objectives of this study. Secondly, the investigation involves credit officers, agric-finance, and relationship managers in the survey. Other officers were involved in the credit risk management process who could have been included in the survey. The sample used was adequate to achieve the purpose of this thesis. Other factors such as weather conditions, pests, and farm inputs that were not incorporated in this study, could affect agricultural activities and hence loan repayment. Finally, external factors such as inflation, exchange rate, technology, the social, economic, and political environment could provide highlights on credit risk management practices of commercial banks in agricultural finance, but these were not incorporated in the study. Besides these limitations, the study achieved its objectives.

7.7 Suggestions for Future Studies

The study elaborated on credit risk management practices of commercial banks in agricultural finance. Agricultural finance is very broad and comes with diverse forms of credit risks. Credit risk identification methods, implementation of credit risk management policies, and strategies to mitigate credit risk exposure associated with agricultural finance were explored in this study. Scholars could seek to explore areas that have not been investigated or use different models for alternative investigation. The current study assessed four commercial banks in Ghana. Future studies could consider increasing the tally of commercial banks for further investigation. For a study of this nature, it would have been useful to incorporate the views and opinions of borrowers in the agricultural value chain finance and personnel from the Banking Supervision Department of the Central Bank of Ghana. This study fails to do this as a result of the limited time frame. The study, therefore, suggests that further studies be conducted to include personnel from the Banking Sector Supervision Department of Bank of Ghana and borrowers from the agricultural value chain finance to examine their opinion on credit risk management practices of commercial banks in agricultural finance. Once credit risk is associated with poor loan performance, searching for major determinants of loan performance in agricultural finance motivates further study.

REFERENCES

- Abata, M. A. (2014). Asset quality and bank performance: A study of commercial banks in Nigeria. *Research Journal of Finance and Accounting*, 5(18), 39-44.
- Abdallah, A. (2016). Agricultural credit and technical efficiency in Ghana: Is there a nexus? *Agricultural Finance Review: Emerald Insight*, 76(2), 309-324. doi:10.1108/AFR-01-2016-0002
- Abdelrahim, K. E. (2013). Effectiveness of credit risk management of Saudi banks in the light of global financial crisis: A qualitative study. *Asian Transactions on Basic and Applied Sciences*, 3(2), 73-91.
- Abdul-Razak, A., & Adafula, C. J. (2013). Evaluating taxpayers' attitude and its influence on tax compliance decisions in Tamale, Ghana. *Journal of Accounting and Taxation*, 5(3), 48-57.
- Abdullah, H., Maamor, S., & Mohamed, W., N. (2013). Finance in the Islamic Banking Scheme: Performance and Effect on Malaysian Output. *Research Journal of Finance and Accounting*, 4(4), 113-121.
- Ábel, I., Lehmann, K., & Tapaszti, A. (2016). The controversial treatment of money and banks in macroeconomics. *Financial and Economic Review*, 15(2), 33-58.
- Abiola, I., & Olausi, A., S. (2014). The impact of credit risk management on the commercial banks' performance in Nigeria. *International Journal of Management and Sustainability*, 3(5), 306.
- Abu, H., H., & Al-Ajmi, J. (2012). Risk management practices of conventional and Islamic banks in Bahrain. *The Journal of Risk Finance*, 13(3), 239.
- Acharya, V. V., Almeida, H., Ippolito, F., & Perez-Orive, A. (2021). Credit lines and the liquidity insurance channel. *Journal of Money, Credit and Banking*, 53(5), 901-938
- Adamu, I., Asongo, A., L., & Nyor, N. (2014). Credit Risk Portfolio Management in Microfinance Banks: Conceptual and Practical Insights. *Universal Journal of Applied Science*, 2(6), 119. doi:10.13189/ujas.2014.020602 <http://www.hrpub.org>
- ADB. (2019). *2019 Financial Reports*. Ghana: ADB Bank.
- ADB. (2020). *2020 financial report*. Ghana: GCB Bank.
- Addae-Korankye, A. (2014). Causes and control of loan default/delinquency in microfinance institutions in Ghana. *American International Journal of Contemporary Research*, 4, 45.
- Addae, A. A., Nyarko-Baasi, M. T., & Tetteh, M. L. (2014). Effect of Exchange Rate Movements on Ghanaian Banks. *Journal of Finance and Accounting*, 2(3), 71. DOI: <https://doi.org/10.11648/j.f.a.20140203.15>
- Addo, A. (2015). *Audit practice and assurance*. (Vol. 3). Accra, Ghana: KOES.
- Adekunle, A. A., Nyikahadzoi, K., & Warinda, P. (2020). Models of Finance Smallholder Farmers to Trigger Agricultural Transformation on An Innovation Platform. *Forum for Agricultural Report in Africa*, 5(23), 9.
- Adeleye, B. C., Annansingh, F., & Nunes, M. B. (2004). Risk management practices in IS outsourcing: An investigation into commercial banks in Nigeria. *International Journal of Information Management*, 24(2), 167-180.
- Adeusi, S. O., Akeke, N. I., Adebisi, O. S., & Oladunjoye, O. (2014). Risk management and financial performance of banks in Nigeria. *European Journal of Business and Management*, 6(31).

- Adjirackor, T., Asare, F. D., Asare, D. D., Gagakuma, W., & Kpawul, E. (2017). Analysis of the Impact of Basel Accord on Asset Quality of Banks in Ghana. *Research Journal of Finance and Accounting*, 8(14).
- Adusei, C. (2018). Determinants of non-performing loans in the banking sector of Ghana between 1998 and 2013. *Asian Development Policy Review*, 6(3), 142-154.
- Afande, F. O. (2014). Credit Risk Management Practices of Commercial Banks in Kenya. *European Journal of Business and Management*, 6(34), 21-62.
- Afriyie, H., & Akotey, J. O. (2012). Credit risk management and profitability of selected rural banks in Ghana. Ghana: Catholic University College of Ghana.
- Agasha, E., Monametsi, G., & Feela, T. (2020). Loan Portfolio Quality of Microfinance Institutions in Uganda: A Qualitative Assessment. *Journal of Financial Risk Management*, 9(02), 155.
- Agbada, A., O. (2015). Agricultural Finance and Optimising Output for Sustainable: Economic Development in Nigeria: An Empirical Analysis. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*, 6(5), 366.
- Agyapong, B. (2015). An Assessment of Credit Risk Management Practices of Agricultural Development Bank Limited. University of Science and Technology. Department of Accounting and Finance. Ghana.
- Ahlin, C., & Waters, B. (2016). Dynamic microlending under adverse selection: Can it rival group lending? *Journal of Development Economics*, 121, 237-257.
- Ahmed, S., & Malik, Q. (2015). Credit risk management and loan performance: An empirical investigation. *International Journal of Economics and Financial Issues*, 5(2), 579.
- Ajayi, S. O., Ajayi, H. F., Enimola, D. J., & Orugun, F. I. (2019). Effect of Capital Adequacy Ratio (CAR) on Profitability of Deposit Money Banks (DMB's): A Study of DMB's with International Operating Licence in Nigeria. *Research Journal of Finance and Accounting*, 10(10), 84-91.
- Akele, A., O., & Stephen, N. (2014). Risk management and financial performance of banks in Nigeria. *European Journal of Business and Management*, 6(31), 336.
- Al-Muharrami, S., & Hardy, D. C. (2014). Cooperative and Islamic banks: What can they learn from each other? *International Perspectives on Participation Advances in the Economic Analysis of Participatory & Labor-Managed Firms*, 15, 73-94.
- Al-Tamimi, H. (2008). Implementing Basel II: An investigation of the UAE banks' Basel II preparations. *Journal of Financial Regulation and Compliance*, 16(2), 187.
- Alabi, J., Alabi, G., & Ahiawodzi, A. (2007). Effects of susu-a traditional micro-finance mechanism on organised and unorganised micro and small enterprises (MSEs) in Ghana. *African Journal of Business Management*, 1(8).
- Alavi, M., Visentin, D. C., Thapa, D. K., Hunt, G. E., Watson, R., & Cleary, M. (2020). Exploratory factor analysis and principal component analysis in clinical studies: Which one should you use? *Journal of Advanced Nursing*, 76(8), 1886-1889.
- Alexander, B., Schmeiser, H., & Schreiber, F. (2018). Return on risk-adjusted capital under Solvency II: Implications for the asset management of insurance companies. *The Geneva Papers on Risk and Insurance-Issues and Practice*, 43(3), 456-472.
- Ali, E. B., Agyekum, E. B., & Adadi, P. (2021). Agricultural for Sustainable Development: A SWOT-AHP Assessment of Ghana's Planting for Food and Jobs Initiative. *Sustainability*, 13(2), 628.

- Allen, D. E., & Powell, R. (2011). *Credit risk measurement methodologies*. Paper presented at the 19th International Congress on Modelling and Simulation.
- Alqudah, H. M., Amran, N. A., & Hassan, H. (2019). Factors affecting the internal auditors' effectiveness in the Jordanian public sector. *EuroMed Journal of Business*, 14(3), 251-273
- Altunbaş, Y., Gadanez, B., & Kara, A. (2006). The evolution of syndicated loan markets, *The Service Industries Journal, Taylor & Francis.*, 26(6), 707. doi:10.1080/02642060600851129.
- Alvarado, R., Ortiz, C., Jiménez, N., Ochoa-Jiménez, D., & Tillaguango, B. (2021). Ecological footprint, air quality, and research and development: The role of agricultural and international trade. *Journal of Cleaner Production*, 288, 125-589.
- Amadhila, E., & Ikhida, S. (2016). Constraints to finance agriculture in Namibia. *African Review of Economics and Finance.*, 8(2), 82-112
- Amedi, M., Dumayiri, M., & Mohammed, A.-R. S. (2019). Loan Repayment and Its Implication on Agricultural Finance in Ghana - The Case of MiDA Agricultural Programme. *International Journal of Agricultural Management and Development (IJAMAD)*, 9(1047-2020-388), 391-408.
- Amin, Z. (2016). Quantification of operational risk: A scenario-based approach. *North American Actuarial Journal*, 20(3), 286-297.
- Amponsah, S. (2017). The impacts of improvements in the delivery of credit from formal and semi-formal financial institutions: Evidence from Ghana. *Journal of African Development, JSTOR*, 19(2), 33-66.
- An, X., Deng, Y., & Gabriel, S. A. (2011). Asymmetric information, adverse selection, and the pricing of CMBS. *Journal of Financial Economics*, 100(2), 304-325.
- Andam, k., S., Arndt, C., & Hartley, F. (2017). Eggs before chickens? Assessing Africa's livestock revolution with an example from Ghana. *International Food Policy Research Institute(IFPRI)*,1-35
- Anghelache, C., & Bodo, G. (2018). General Methods of Management the Credit Risk. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 8(1), 143-152.
- Anku-Tsede, O. (2014). Microfinance intermediation: Regulation of financial NGOs in Ghana. *International Journal of Law and Management, Emerald Insight*, 54(4), 276-308
- Antwi, S. K., Inusah, A. M., & Hamza, K. (2015). The effect of demographic characteristics of small and medium entrepreneurs on tax compliance in the tamale metropolis, Ghana. *International Journal of Economics, Commerce and Management*, 3(3), 1-20.
- Apanga, M., A., Appiah, K., O., & Arthur, J. (2016). Credit risk management of Ghanaian listed banks. *International Journal of Law and Management*, 58(2), 178.
- Appiah-Twumasi, M., Donkoh, S. A., & Ansah, I. G. K. (2019). Farmer innovations in finance smallholder maize production in Northern Ghana. *Agricultural Finance Review Agricultural Finance Review, Emerald Publishing Limited*, 80(3), 421-436. doi:10.1108/AFR-05-2019-0059
- Argento, D., Umans, T., Håkansson, P., & Johansson, A. (2018). Reliance on the internal auditors' work: Experiences of Swedish external auditors. *Journal of Management Control*, 29(3), 295-325.

- Arslan, O., & Karan, M. B. (2009). Credit risks and internationalisation of SMEs. *Journal of Business Economics and Management*, 10(4), 361-368.
- Asfaw, A. H., & Veni, P. (2015). Empirical Study on Credit Risk Management Practice of Ethiopian Commercial Banks. *Research Journal of Finance and Accounting*, 6(3), 134-147.
- Ash-shu, A. (2013). Determinants and Impacts of Internal Credit Rating. *International Journal of Financial Research*, 4(1), 120-131.
- Asiama, R. K., & Amoah, A. (2019). Non-performing loans and monetary policy dynamics in Ghana. *African Journal of Economic and Management Studies*, 10(2), 169-184.
- Asiedu, E., & Fosu, K. (2004). *Importance of agricultural credit in Ghana's credit sector: A logit model analysis*. Paper presented at the World Bank and ADB Conference, 1-24.
- Asongo, A., I., & Adamu, I. (2014). The Causes of Loan Default in Microfinance Banks: The Experience of Standard Microfinance Bank, Yola, Adamawa State, Nigeria. *Journal of Business and Management (IOSR-JBM)*. 16(11), 74-81.
- Assefa, E., Hermes, N., & Meesters, A. (2013). Competition and the performance of Microfinance Institutions. *Applied Financial Economics*, 23(9), 768-782. DOI: 10.1080/09603107.2012.754541
- Atuguba, R., & Dowuona-Hammond, C. (2006). Corporate Social Responsibility in Ghana. Accra, Ghana: Friedrich Ebert Foundation (FES), Report, 1-115
- Awunyo-Victor, D., Al-Hassan, R., Mahama, Sarpong, D., Bruce, & Egyir, I. (2014). Agricultural credit rationing in Ghana: What do formal lenders look for? *Agricultural Finance Review, Emerald Insight.*, 74(3), 364-378.
- Ayerakwa, H. M., Dzanku, F. M., & Sarpong, D. B. (2020). The geography of agricultural participation and food security in a small and medium-sized city in Ghana. *Agricultural and Food Economics*, 8, 1-21.
- Azeem, M., Salfi, N. A., & Dogar, A. (2012). Usage of NVivo software for qualitative data analysis. *Academic Research International*, 2(1), 262-266.
- Baassiri, M., & Bizri, R. (2018). Credit risk management in the banking sector during the low-growth period: Evidence from Lebanon. *International Review of Business Papers*, 14(1), 204.
- Babaei, G., & Bamdad, S. (2020). A multi-objective instance-based decision support system for investment recommendation in peer-to-peer lending. *Expert Systems with Applications; Elsevier*, 150, 113278.
- Babu, S. C., & Shishodia, M. (2017). Analytical review of African agribusiness competitiveness. *Africa Journal of Management*, 3(2), 145-162.
- Bae, D. S. (2020). Internal credit rating framework for real asset investment. *International Journal of Strategic Property Management*, 24(1), 38-50.
- Baklouti, N., Gautier, F., & Affes, H. (2016). Corporate governance and financial distress of European commercial banks. *Journal of Business Studies Quarterly*, 7(3), 75.
- Bandyopadhyay, A. (2016). Predicting Probability of Default of Indian Corporate Bonds: Logistic and Z-Score Model Approaches. *The Journal of Risk Finance*, 7(3), 272. DOI: <http://dx.doi.org/10.1108/15265940610664942>
- Barnor, C., & Odonkor, T., A. (2012). Capital Adequacy and Performance of Ghanaian Banks. *Journal of Business Research*, 6(1-2).

- Barros, C. P., Ferreira, C., & Williams, J. (2007). Analysing the determinants of performance of best and worst European banks: A mixed logistic approach. *Journal of Banking & Finance*, 31(7), 2189-2203.
- Barth, J. R., Caprio, G., & Levine, R. (2013). Bank regulation and supervision in 180 countries from 1999 to 2011. *Journal of Financial Economic Policy*, 5(2), 219.
- Basel. (2010). Banking Supervision. *Committee on banking supervision*. Transnational economic Governance, Brill/Nijhoff, 319-328
- Basel. (2013). A brief history of the Basel Committee. Switzerland: Basel Committee on Banking Supervision.
- Basel. (2015). Guidelines, Corporate governance principles for banks. *Bank for international settlements*.
- Basel. (2017). Finalising Basel III in brief. Bank for International Settlements. Retrieved from https://www.bis.org/bcbs/publ/d424_inbrief.pdf.
- Bayyoud, M., & Sayyad, N. (2015). The relationship between credit risk management and profitability between investment and commercial banks in Palestine. *International Journal of Economics and Finance*, 7(11), 163.
- Bazeley, P., & Jackson, K. (2013). *Qualitative data analysis with NVivo*. Sage Publications Limited, 1-441
- Beisland, L. A., D'Espallier, B., & Mersland, R. (2019). The commercialisation of the microfinance industry: Is there a 'personal mission drift among credit officers? *Journal of Business Ethics*, 158(1), 119-134.
- Belás, J., Mišanková, M., Schönfeld, J., & Gavurová, B. (2017). Credit risk management: Financial safety and sustainability aspects. *Journal of Security and Sustainability Issues*, 7(1), 79-74.
- Ben Moussa, M., A. (2013). Impact of capital on the financial performance of banks: The case of Tunisia. *Banks and Bank Systems*, 8(4), 54.
- Bernoulli, D. (1954). Exposition of a new theory on the measurement. *Econometrica*, 22(1), 23-36.
- Bertoldo, R. (2020). A comparative frame for a contextualised analysis of local natural risk management. *International Journal of Disaster Risk Reduction*, 101945.
- Bhattacharya, B., & Roy, T. N. (2008). Macroeconomic determinants of asset quality of Indian public sector banks. *The ICAFI Journal of Bank Management*, VII(1), 21-40., VII(1), 40.
- Bhattacharjee, A. (2012). *Social science research: Principles, methods, and practices* (2nd ed.). Retrieved from http://scholarcommons.usf.edu/oa_textbooks/3
- Biekpe, N. (2011). The competitiveness of commercial banks in Ghana. *African Development Review Journal*, 23(1), 87.
- Bilal, A. R., & Baig, M. M. A. (2019). Transformation of agricultural risk management. *Agricultural Finance Review*, 79(1), 136-155.
- Blanco-Oliver, A., Reguera-Alvarado, N., & Veronesi, G. (2021). Credit risk in the microfinance industry: The role of gender affinity. *Journal of Small Business Management*, 1-32.
- Blazy, R., & Weill, L. (2013). Why do banks ask for collateral in SME lending? *Applied Financial Economics*, 23(13), 1109-1122.
- Boadi, I., Dana, L. P., Mertens, G., & Mensah, L. (2017). SMEs' finance and banks' profitability: A "good date" for banks in Ghana? *Journal of African Business*, 18(2), 257-277.

- Boahene, S. H., Dasah, J., & Agyei, S. K. (2012). Credit Risk and Profitability of Selected Banks in Ghana. *Research Journal of Finance and Accounting*, 3(7), 15. DOI:file:///C:/Users/alial_000/Downloads/26
- Bodla, B., & Verma, R. (2009). Credit risk management framework at banks in India. *The IUP Journal of Bank Management*, 8(1), 47-72.
- BoE. (2019). Outsourcing and third-party risk management. Prudential regulation authority. Consultation Paper | CP30/19. Retrieved from <https://www.bankofengland.co.uk>
- BoG. (2017). *Banking Sector Report 2017*, Bank of Ghana. Ghana
- BoG. (2018). *Banking sector report 2018*. Bank of Ghana
- BoG. (2019). *Explanatory notes to the fit, and proper person directive for banks, savings and loans Companies, Finance Houses and Financial Holding Companies*. Bank of Ghana
- BoG. (2020a). *2020 banking sector report*. Bank of Ghana
- BoG. (2020b). *Banking sector report. Collateral Registry. All you need to know*. Bank of Ghana
- BoG. (2021). *Banking sector reports, 2021*. Ghana: Bank of Ghana
- Boguslauskas, V., & Mileris, R. (2009). Estimation of Credit Risk by Artificial Neural Networks Models. *Izinerine Ekonomika-Engineering Economics*, 64(4), 14.
- Bokpin, G. A. (2013). Ownership structure, corporate governance, and bank efficiency: An empirical analysis of panel data from the banking industry in Ghana. *Corporate Governance: The international journal of business in society*, 13(3), 287.
- Borisov, P., Qerimi, F., & Behluli, A. (2020). Diagnostics of Marketing Concepts of Commercial Banks in Providing Loans to Agricultural Sector of Kosovo. *Journal of Bio-based Marketing*, 1, 32-48.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 101.
- Brester, G. W., & Watts, M. J. (2019). The Basel accords, capital reserves, and agricultural lending. *Agricultural Finance Review*, 79(1), 27-47.
- Brick, I. E., & Fung, W. K. (1984). The effect of taxes on the trade credit decision. *Financial Management: Wiley Online Library*, 24-30.
- Brown, M., Jappelli, T., & Pagano, M. (2009). Information sharing and credit: Firm-level evidence from transition countries. *Journal of Financial Intermediation*, 18(2), 172.
- Brunner, A., & Krahen, J. P. (2008). Multiple lenders and corporate distress: Evidence on debt restructuring. *The Review of Economic Studies*, 75(2), 415-442.
- Bülbül, D., Hakenes, H., & Lambert, C. (2019). What influences banks' choice of credit risk management practices? Theory and evidence. *Journal of Financial Stability*, 40, 1-14.
- Bumacov, V., Ashta, A., & Singh, P. (2014). The use of credit scoring in microfinance institutions and their outreach. *Strategic Change*, 23(7-8), 401-413.
- Bunea, M., & Dinu, V. (2019). The BASEL III impact on the Romanian Banks' Solvency. *Montenegrin Journal of Economics*, 15(1), 189-198.
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Walker, K. (2020). Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing*, 25(8), 652-661.

- Caruso, G., Gattone, S., Fortuna, F., & Di Battista, T. (2021). Cluster Analysis for mixed data: An application to credit risk evaluation. *Socio-Economic Planning Sciences, Elsevier*, 73, 100-850.
- Castro, V. (2013). Macroeconomic determinants of the credit risk in the banking system: The case of the GIPSI. *Economic Modelling*, 31, 672-683.
- Cather, D. A. (2010). A gentle introduction to risk aversion and utility theory. *Risk Management and Insurance Review*, 13(1), 127-145.
- Cerqueiro, G., Ongena, S., & Roszbach, K. (2016). Collateralization, bank loan rates, and monitoring. *The Journal of Finance*, 71(3), 1295-1322.
- Chai, N., Wu, B., Yang, W., & Shi, B. (2019). A multicriteria approach for modeling small enterprise credit rating: Evidence from China. *Emerging Markets Finance and Trade*, 55(11), 2523-2543.
- Chakazamba, L., & Marime, N. (2016). Lending in Zimbabwe: Are Banks Using Enough Sources of Information to Make Lending Decisions? *Research Journal of Finance and Accounting*, 7(8), 166-171.
- Chali, G. A., & Reddy, P. (2016). Effectiveness of Credit Risk Management of Ethiopian Commercial Banks: The case of some public and private banks. *International Journal in Management & Social Science*, 4(7), 526-541.
- Chan, S.-G., Koh, E. H., & Abd Karim, M. Z. (2016). The Chinese banks' directors and their risk-taking behavior. *Chinese Management Studies*, 10(2), 311. doi:10.1108/CMS-10-2015-0226
- Chandio, A. A., Jiang, Y., Wei, F., Rehman, A., & Liu, D. (2017). Farmers' access to credit: Does collateral matter or cash flow matter? - Evidence from Sindh, Pakistan. *Cogent Economics & Finance*, 5(1), 1369383.
- Chen, H., & Xiang, Y. (2017). The study of credit scoring model based on group lasso. *Procedia Computer Science*, 122, 677-684.
- Chilukuri, S., & Rao, K. S. (2014). Effective Credit Approval and Appraisal System: Loan Review Mechanism of Commercial Banks. *International Journal of Innovative Research and Development*, 3(12), 267-274.
- Chiu, T. K. (2017). Factors influencing microfinance engagements by formal financial institutions. *Journal of Business Ethics*, 143(3), 565-587.
- Choudhury, A., Jones, J., & Opare-Addo, M. (2020). Perceived Risk and Willingness to Provide Loan to Smallholder Farmers in Ghana. *Journal of African Business, Taylor and Francis*. doi:10.1080/15228916.2020.1773732
- Chowdhury, M., & Alam, Z. (2020). The Impact of Ethics on Organizational Performance: The case of Private Commercial Banks of Bangladesh. *The USV Annals of Economics and Public Administration*, 20(2 (32)).
- Chuan, C., L. (2006). Sample size estimation using Krejcie and Morgan and Cohen statistical power analysis: A comparison. *Jurnal Penyelidikan IPBL, China*, 7(1), 79-86.
- Churchill, R. Q. (2013). An evaluation of the risk profile of the banking industry in Ghana and its implication on the national economy. *International Journal of Economics, Finance and Management Sciences*, 1(6), 367-373.
- Cooper, B., Leung, P., Dellaportas, S., Ahmad, Z., & Taylor, D. (2009). Commitment to independence by internal auditors: The effects of role ambiguity and role conflict. *Managerial Auditing Journal*, 24(9), 899-925.

- Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3 ed.). Thousand Oaks, CA: Sage.
- Corradin, S., Heider, F., & Hoerova, M. (2017). Working Paper Series on collateral: Implications for financial stability and monetary policy. European Central Bank, *Eurosystem*.
- Couto, G., & Bulhões, K. (2009). Basel II, Operational Risk Measurement in the Portuguese Banking Sector. *Portuguese Journal of Management Studies*, 14(3), 277.
- Cressy, R., & Toivanen, O. (2001). Is there adverse selection in the credit market? *Venture Capital: An International Journal of Entrepreneurial Finance*, 3(3), 215-238.
- Creswell, J., W. (2014). *Research Design* (U. Flick Ed. 4 ed. Vol. 8). SAGE Publications, Inc.
- Creswell, J., W., Clark, V., & Plano, L. (2017). *Designing and conducting mixed methods research*. Sage Publications.
- Crouhy, M., Galai, D., & Mark, R. (2006). *The Essentials of Risk Management*. McGraw-Hill. The USA.
- Cucinelli, D., Gai, L., Ielasi, F., & Patarnello, A. (2020). Preventing the deterioration of bank loan portfolio quality: A focus on unlikely-to-pay loans. *The European Journal of Finance*, 1-22.
- Cuestas, J. C., Lucotte, Y., & Reigl, N. (2020). Banking sector concentration, competition, and financial stability: The case of the Baltic countries. *Post-Communist Economies*, 32(2), 215-249.
- Čular, M., Slapničar, S., & Vuko, T. (2020). The Effect of Internal Auditors' Engagement in Risk Management Consulting on External Auditors' Reliance Decision. *European Accounting Review*, 29(5), 999-1020.
- Danso, P. O., Kong, Y., Owusu-Akomeah, M. N., & Afriyie, S. O. (2019). Constructive Bearing of Corporate Governance Mechanisms on Organizations: A Review of Corporate Governance Manual in Ghana. *American Journal of Multidisciplinary Research*, 8(1), 514-521
- Daum, T., & Birner, R. (2017a). The neglected governance challenges of agricultural mechanisation in Africa—insights from Ghana. *Food Security*, 9(5), 959-979.
- Umoru, D., & Osemwegie, M. (2016). Capital Adequacy and Financial Performance of Banks in Nigeria: Empirical Evidence Based on the FGLS Estimator. *European Scientific Journal*, 12, 295-305.
- Dawney, L., Kirwan, S., & Walker, R. (2020). The intimate spaces of debt: Love, freedom, and entanglement in indebted lives. *Geoforum*, 110, 191-199.
- De-Ramon, S., & Straughan, M. (2020). The evolution of competition in the UK deposit-taking sector, 1989–2013. *Banks and Financial Markets in Times of Uncertainty. The European Journal of Finance*, 26(10), 958-977. doi:10.1080/1351847X.2019.1574270
- Delis, M. D., Koutsomanoli-Fillipaki, A., Staikouras, C. K., & Katerina, G. (2009). Evaluating cost and profit efficiency: A comparison of parametric and nonparametric methodologies. *Applied Financial Economics*, 19(3), 191-202.
- Demeke, M., Kiermeier, M., Sow, M., & Antonaci, L. (2016). Food insecurity risk management in Africa: Concepts, lessons learned and review guidelines. Food and Agricultural Organisation of the United Nations, 1-70

- Derbali, A., & Hallara, S. (2013). Analysis of Default Probability: A Comparative Theoretical Approach between the Credit Portfolio View Model and the Creditrisk Model. *International Journal of Business Management & Research (IJBMR)*, 3(1), 157-170.
- Derban, W. K., Binner, J. M., & Mullineux, A. (2005). "Loan repayment performance in community development finance institutions in the UK." *Small Business Economics*, 25, 319.
- Dexu, H., & Wenlong, M. (2016). Financial Exclusion and Inclusive Finance. *China Economist*, 11(3), 64-67.
- Dia, E. (2013). How do banks respond to shocks? A dynamic model of deposit-taking institutions. *Journal of Banking & Finance*, 37(9), 3623-3638. doi:10.1016/j.jbankfin.2013.05.023.
- Dien, J. (2010). Evaluating two-step PCA of ERP data with geomin, infomax, oblimin, Promax, and varimax rotations. *Psychophysiology*, 47(1), 170-183.
- Dinu, A. (2012). Modern Methods of Risk Identification in Risk Management. *International Journal of Academic Research in Economics and Management Sciences.*, 1(6), 52-67.
- Djankov, S., McLiesh, C., & Shleifer, A. (2007). Private credit in 129 countries. *Journal of Financial Economics*, 84(2), 299-329.
- Dlugosch, T. J., Klinger, B., Frese, M., & Klehe, U. C. (2018). Personality-based selection of entrepreneurial borrowers to reduce credit risk: Two studies on prediction models in low-and high stakes settings in developing countries. *Journal of Organizational Behavior*, 39(5), 612-628.
- Doran, A., McFadyen, N., & Vogel, R. C. (2009). The Missing Middle in Agricultural Finance. OXFAM Research Report 9(7), 1-52.
- Doriana, C. (2016). "Can speed kill? The cyclical effect of rapid credit growth: evidence from bank lending behavior in Italy." *The Journal of Risk Finance*. *The Journal of Risk Finance*, 17(5), 562-584. Retrieved from [https:// doi.org/](https://doi.org/)
- Dvouletý, O., Čadil, J., & Mirošník, K. (2018). Do firms supported by credit guarantee schemes report better financial results 2 years after the end of intervention? *The BE Journal of Economic Analysis & Policy*, 19(1), 57. doi.org/10.1515/bejeap-2018-0057
- ECB. (2019). *Financial Reports*. Retrieved from Ghana:
- ECCB. (2009). Guidelines on credit risk management for Institutions licensed to conduct Banking Business under the Banking Act.
- Egwu, P. N. (2016). Impact of agricultural finance on agricultural output, economic growth, and poverty alleviation in Nigeria. *Journal of Biology, Agricultural and Healthcare*, 6(2), 36-42.
- Eijffinger, S. C. (2012). Rating agencies: Role and influence of their sovereign credit risk assessment in the eurozone. *JCMS: Journal of Common Market Studies*, 50(6), 912-921.
- Engel, R. J., & Schutt, R. K. (2012). *The practice of research in social work* (3 ed.). Sage Publications.
- Ezangina, I. A., Evstratov, A. V., & Jovanovic, T. G. (2016). Challenges and perspectives for the development of banking credit infrastructure in Russia. *International Journal of Economics and Financial Issues*, 6(2S), 58-64.

- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: Hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, 5(1), 80-92.
- Ferrari, S., Van Roy, P., & Vespro, C. (2021). Sensitivity of credit risk stress test results: Modelling issues with an application to Belgium. *Journal of Financial Stability*. 52(1), 42-56. doi:10.1016/j.jfs.2020.100805
- Ferri, G., Murro, P., Peruzzi, V., & Rotondi, Z. (2019). Bank lending technologies and credit availability in Europe: What can we learn from the crisis? *Journal of International Money and Finance*, 95, 128-148.
- Figueiredo, R., Martina, M. L. V., Stephenson, D. B., & Youngman, B. D. (2018). A probabilistic paradigm for the parametric insurance of natural hazards. *Risk Analysis*, 38(7), 2414.
- Flatnes, J. E., & Carter, M. R. (2019). A little skin in the game: Reducing moral hazard in joint liability lending through a mandatory collateral requirement. *Journal of Economic Behavior & Organization*, 164, 199-214.
- Freimer, M., & Gordon, M. J. (1965). Why do bankers ration credit. *The Quarterly Journal of Economics*, 79(3), 397-416.
- Funso, T., K., Kolade, A., Oke, R., & Ojo, M. (2012). Credit risk and Commercial Banks performance in Nigeria: A panel approach. *Australian Journal of Business and Management Research*, 2(2), 31-38.
- Gadzo, S. G., Kportorgbi, H. K., & Gatsi, J. G. (2019). Credit risk and operational risk on the financial performance of universal banks in Ghana: A partial least squared structural equation model (PLS-SEM) approach. *Cogent Economics & Finance*, 7(1), 1-16..
- GCB. (2020). Financial Report 2020. Annual report. GCB bank
- Gekara, M., & Mutua, S.W. (2017). Credit risk management strategies and their impact on commercial banks in Kenya. *Imperial Journal of In-disciplinary Research (IJIR)*, 3(4), 75-87. Retrieved from <http://www.onlinejournal.in>
- Genest, B., & Brie, L. (2013). "Basel II IRB Risk Weight Functions- Demonstration and Analysis". The Global Research & Analytics Department of Chappuis Halder & Cie, 1-29.
- Gerito, T. (2020). Agricultural Finance and the role of formal Institutions in improving rural livelihood: In case of West Guji Zone Selected Weredas. *Journal of Indigenous Knowledge and Development Studies*, 1(2), 179-203.
- Gichimu, S. (2013). Credit Reference Bureaus, Loans Advancement and Recovery Performance by the Higher Education Loans Board of Kenya. *Journal of Modern Accounting and Auditing*, 4(3), 31-42.
- Glenn, A., B., (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, 9(2), 27-40. doi:10.3316/QRJ0902027.
- Gouri, K., & Mahajan, V. (2017). Different Models of Finance Small Farmers' Agricultural Value Chains. In *Finance Agricultural Value Chains in India*. 1(1), 33-53: Springer.
- GPIR. (2016). Using the 6th Ghana Living Standards Survey. Retrieved from Ghana:
- GSGDA. (2018). Medium-term national development policy framework. Ghana: National development planning commission (NDPC)
- GSGDA. (2021). National development planning commission (NDPC). Ghana: National development planning commission

- GSS. (2017). 2010 Population and Housing Census. National analytical review. Retrieved from Ghana Statistical Services.
- Guio, A., Gordon, D., Marlier, E., Najera, H., & Pomati, M. (2017). Towards an EU measure of child deprivation. Luxembourg Institute of Socio-Economic Research (LISER), Esch-Sur-Alzette, Luxembourg. University of Bristol & Cardiff University, UK. 11(1), 835-860.
- Guiral, A., Moon, D., & Perez-Garcia, J. (2016). Can corporate social responsibility bias affect lending decisions? *Spanish Journal of Finance and Accounting/Revista Española de Financiación y Contabilidad*, 45(4), 466-486.
- Guiringer, C., & Boucher, S. R. (2008). Credit constraints and productivity in Peruvian agriculture. *Agricultural Economics*, 39(3), 295-308.
- Guo, Y., Zhou, W., Luo, C., & Liu, C. (2016). Instance-based credit risk assessment for investment decisions in P2P lending. *European Journal of Operational Research*, 249(2), 417-426
- Gupta, J., Wilson, N., Gregoriou, A., & Healy, J. (2014). The value of operating cash flow in modeling credit risk for SMEs. *Applied Financial Economics*, 24(9), 649-660.
- Guttman, J. M. (2008). Assortative matching, adverse selection, and group lending. *Journal of Development Economics*, 87(1), 51-56.
- Gyapong, A. Y. (2021). Land grabs, farmworkers, and rural livelihoods in West Africa: some silences in the food sovereignty discourse. *Globalizations*, 18(3), 339-354.
- Haile, F. (2015). Determinants of loan repayment performance: A case study of Harare microfinance institutions. *Journal of Agricultural Extension and Rural Development*, 7(2), 56-64.
- Harelimana, J., B. (2017). The Role of Risk Management on Financial Performance of Banking Institutions in Rwanda. *Business and Economics Journal*, 8(1), 279-284. doi:10.4172/2151-6219.1000284
- Harris, T. (2015). Credit scoring using the clustered support vector machine. *Expert Systems with Applications, Elsevier*, 42(2), 741-750.
- Hartley, D., & French, S. (2020). A Bayesian method for calibration and aggregation of expert judgment. *International Journal of Approximate Reasoning*, 130, 192-225.
- Hatcher, L., & O'Rourke, N. (2013). *A step-by-step approach to using SAS for factor analysis and structural equation modeling*. 3rd ed., Sas Institute.
- Hiwatashi, J. (2008). Enhancing Cyber Risk Management with the Framework of ERM and Basel II. In *Cyberlaw for Global E-business: Finance, Payments and Dispute Resolution* (pp. 34-52): IGI Global.
- Ho, C. S. F., & Yusoff, N. I. (2009). A Preliminary Study on Credit Risk Management Strategies of Selected Financial Institution in Malaysia. *Jurnal Pengurusan (UKM Journal of Management)*, 28, 45-65
- Hodson, D. (2009). European Perspectives on the Global financial crisis: Introduction. *Journal of Common Market Studies*, 47(5), 939-953.
- Hong, Z., & Zhou, Y. (2013). Can a third party's collateral arrangements tackle the finance problem of small-medium enterprises? *China Finance Review International, Emerald Insight*, 3(4), 353-380 doi:10.1108/CFRI-08-2012-0094
- Huang, Y. (2018). Research on Credit Risk Identification of Real Estate Industry in China's Commercial Banks. *Advances in Economics, Business and Management Research (AEBMR)*, Shanghai University, P.R. China., 37, 663-675.

- Hull, J., C., (2018). *Risk management and financial institutions*. 5th ed., Wiley & Sons, Inc., Hoboken, New Jersey.
- IFC. (2018). *Developing a Strong Credit Reporting System a Toolkit for Practitioners Public*. World Bank Group.
- Ikpefan, O. (2013). Capital adequacy, management and performance in the Nigerian commercial bank (1986 - 2006). *African Journal of Business Management*, 7(30), 2938-2950.
- IMF. (2014). *Financial Sector Assessment Program Update. Basel Core Principles for Effective Banking Supervision Assessment of Compliance International Monetary Fund*. Washington, D.C.2014:
- Indra, K., K., (2015). Study of Credit Risk Identification Techniques Followed by Commercial Banks in Nepal. *Journal of Advanced Academic Research (JAAR)*. 2(2), 1-17.
- Isin, A. A. (2018). Tax avoidance and cost of debt: The case for loan-specific risk mitigation and public debt finance. *Journal of Corporate Finance*, 49, 344-378.
- Jackson, D. (2009). The significance level of the standard test for a treatment effect in meta-analysis. *Statistics in Biopharmaceutical Research*, 1(1), 92-100.
- Jappelli, T., & Pagano, M. (2002). Information sharing, lending, and defaults: Cross-country evidence. *Journal of Banking & Finance*, 26(10), 2017-2045.
- Jarrow, R. A., & Turnbull, S. M. (2000). The intersection of market and credit risk. *Journal of Banking & Finance*, 24(1-2), 271-299.
- Jiménez, G., Salas, V., & Saurina, J. (2009). Organizational distance and use of collateral for business loans. 33(2), 234-243.
- Johnstone, I. M., & Lu, A. Y. (2009). On consistency and sparsity for principal components analysis in high dimensions. *Journal of the American Statistical Association*, 104(486), 682-693.
- Jokivuolle, E., & Peura, S. (2010). Rating targeting and dynamic economic capital. *The Journal of Risk*, 12(4), 3-13.
- Joos, P., Piotroski, J. D., & Srinivasan, S. (2016). Can analysts assess fundamental risk and valuation uncertainty? An empirical analysis of scenario-based value estimates. *Journal of Financial Economics*, 121(3), 645-663.
- Just, D. R., & Peterson, H. H. (2003). Diminishing marginal utility of wealth and calibration of risk in agriculture. *American Journal of Agricultural Economics*, 85(5), 1234-1241.
- Kattel, I. K. (2015). Risk Identification Techniques Followed by Commercial Banks in Nepal. . *Journal of Advanced Academic Research (JAAR)*. 2(2), 1-17. Retrieved from www.phdcentre.edu.np
- Kessey, D. (2015). Assessing Credit Risk Management Practices in the Banking Industry of Ghana: Processes and Challenges. *Global Journal of Management and Business*, 15(6), 1-10.
- Khalid, S., & Amjad, S. (2012). Risk management practices in Islamic banks of Pakistan. *The Journal of Risk Finance*, 13(2), 148-159.
- Kim, H.-Y. (2014). Analysis of variance (ANOVA) comparing means of more than two groups. *Restorative Dentistry & Endodontics*, 39(1), 74-77.
- Kimotho, D., N., & Gekara, M. (2016). Effects of credit risk management practices on the financial performance of commercial banks in Kenya. *International Journal of Economics & Finance*, 2(3), 116-189

- Kirschenmann, K. (2016). Credit rationing in small firm-bank relationships. *Journal of Financial Intermediation*, 26, 68-99.
- Kitonga, P. (2017). Determinants of Staff Competence on the Effectiveness of Debt Collection in Commercial Banks. *International Journal of Finance and Accounting*, 2(4), 24-45.
- Ključnikov, A., & Belás, J. (2016). Approaches of Czech entrepreneurs to debt finance and management of credit risk. *Equilibrium - Quarterly Journal of Economics and Economic Policy*, 23(2), 343-365.
- Kodithuwakku, S. (2015). Impact of credit risk management on the performance of commercial banks in Sri Lanka. *International Journal of Scientific Research and Innovative Technology*, 2(7), 1-6.
- Kofarmata, Y. I., & Danlami, A. H. (2019). Determinants of credit rationing among rural farmers in developing areas. *Agricultural Finance Review*, 79(2), 158-173.
- Konovalova, N. (2009). Problems of the evaluation of credit risk in commercial banks. *Journal of Business Management*, 2, 84-121
- Konovalova, N., Kristovska, I., & Kudinska, M. (2016). Credit risk management in commercial banks. *Polish Journal of Management Studies*, 13(2), 90-100
- Kosztján, Z. T., & Katona, A. I. (2018). Risk-Based X-bar chart with variable sample size and sampling interval. *Computers & Industrial Engineering*, 120, 308-319.
- Kozodoi, N., Lessmann, S., Papakonstantinou, K., Gatsoulis, Y., & Baesens, B. (2019). A multi-objective approach for profit-driven feature selection in credit scoring. *Decision Support Systems, Elsevier*, 120, 106-117.
- Krejcie, R., V., & Morgan, D., W. (1970). Determining sample size for research activities. Education, and psychological measurement. *Sage Journal*, 30(3), 607-610.
- Kumar, P., & Kavita, D. (2016). Credit Risk Management System And Framework In Banking Sector. *International Journal of Management and Social Science Research Review*, 1(1). 7-26
- Kunbuor, B., Ali-Nakyea, A., & Demitia, W., K., O.,. (2017). Law of taxation in Ghana. 4th ed., Type Publishers, Ghana.
- Kusi-Baah, A., & Opoku-Mensah, M. (2018). Does credit information sharing affect the funding cost of banks? Evidence from African banks. *International Journal of Finance & Economics*, 23(1), 19-28.
- Kusi, B., Agbloyor, E., Fiador, V., Osei, K., & (2016). Credit referencing bureaus and bank credit risk: evidence from Ghana. Evidence from Ghana. *Africa Finance Journal*.
- Kwakye, J., K. (2012). Financial intermediation and the cost of credit in Ghana. Institute of Economic Affairs (IEA): Ghana.
- Kwame, J. A., Tchao, E. T., & Poku, K. (2013). Integration of Tax Administration to Curb Import and Domestic Tax Evasions in Ghana. *International Journal of Business and Social Research (IJBSR)*, 3(11), 87-100
- Kwan, S. H. (2006). The X-efficiency of commercial banks in Hong Kong. *Journal of Banking & Finance*, 30(4), 1127-1147.
- Lagat, F., K., Mugo, R., & Otuya, R. (2018). Effect of Credit Risk Management Practices on Lending Portfolio Among Savings and Credit Cooperatives in Kenya. *European Journal of Business and Management*, 5(19), 93-105.
- Lall, R. (2012). From failure to failure: The politics of international banking regulation. *Review of International Political Economy*, 19(4), 609-638. doi:10.1080/09692290.2011.603669

- Lalon, R. M. (2015). Credit risk management (CRM) practices in commercial banks of Bangladesh: "A study on basic bank Ltd." *International Journal of Economics, Finance and Management Sciences*, 3(2), 78-90.
- Lang, W., & Jagtiani, J. (2010). The mortgage and financial crises: The role of credit risk management and corporate governance. *Atlantic Economic Journal*, 38(2), 123-144.
- Lazarova, M., Cerdin, J.-L., & Liao, Y. (2014). The internationalism career anchor: A validation study. *International Studies of Management & Organization*, 44(2), 9-33.
- Le, T. T. D., & Diep, T., T. (2020). The Effect of Lending Structure Concentration on Credit Risk: The Evidence of Vietnamese Commercial Banks. *Journal of Asian Finance, Economics and Business*, 7(7), 59-72. doi:10.13106/jafeb.2020.vol7.no7.059
- Ledesma, R. D., Valero-Mora, P., & Macbeth, G. (2015). The scree test and the number of factors: A dynamic graphics approach. *The Spanish Journal of Psychology*, 18. E11, 1-10. doi:10.1017/sjp.2015.13
- Lee, T., & Chih, S. (2013). Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks. *North American Journal of Economics and Finance*, 26, 705-724.
- Leow, M., & Crook, J. (2014). Intensity models and transition probabilities for credit card loan delinquencies. *European Journal of Operational Research*, 236(2), 685-694.
- Lilburne, L., & Tarantola, S. (2009). Sensitivity analysis of spatial models. *International Journal of Geographical Information Science*, 23(2), 151-168.
- Linting, M., & van der Kooij, A. (2012). Nonlinear principal components analysis with CATPCA: a tutorial. *Journal of Personality Assessment*, 94(1), 12-25.
- Liu, X., Sun, J., Yang, F., & Wu, J. (2020). How ownership structure affects bank deposits and loan efficiencies: An empirical analysis of Chinese commercial banks. *Annals of Operations Research*, 290(1), 983-1008.
- Love, I., & Ariss, R. T. (2014). Macro-financial linkages in Egypt: A panel analysis of economic shocks and loan portfolio quality. *Journal of International Financial Markets, Institutions and Money*, 28, 158-181.
- Luqman, O. (2014). The effect of credit risk on the performance of commercial banks in Nigeria. *Australian Journal of Business and Management Research*, 2(2), 31-38.
- Luvannyam, D., Minjuur, E., Lkhagvadorj, D., & Bekhbat, E. (2021). Non-performing loan recovery: the case of Mongolia. *Journal of Applied Finance and Banking*, 11(1), 81-97
- Lynam, P. (2019). *Standing the Test of Time Banking on Change: The Development and Future of Financial Services*. Wiley and Sons Ltd, 21-26. doi:10.1002/9781119610038.ch2
- Mabel, O. A., & Olayemi, O. S. (2020). A Comparison of Principal Component Analysis, Maximum Likelihood, and the Principal Axis in Factor Analysis. *American Journal of Mathematics and Statistics*, 2(10), 44-54.
- Mačerinskienė, I., Ivaškevičiūtė, L., & Railienė, G. (2014). The financial crisis impact on credit risk management in commercial banks. *KSI Transactions on the Knowledge Society*, 7(1), 5-16
- Machoka, O. S., & Jagongo, A. (2020). Competitive information sharing and credit scoring on the performance of commercial banks in Kenya. *International Academic Journal of Economics and Finance*, 3(5), 45-61.

- Madestam, A. (2014). Informal finance: A theory of moneylenders. *Journal of Development Economics*, 107, 157-174.
- Madugu, A. H., Ibrahim, M., & Amoah, J. O. (2020). Differential effects of credit risk and capital adequacy ratio on the profitability of the domestic banking sector in Ghana. *Transnational Corporations Review*, 12(1), 37-52.
- Magali, J. J. (2014). Effectiveness of loan portfolio management in rural SACCOS: Evidence from Tanzania. *Business and Economic Research*, 4(1), 299-318.
- Maggi, B., & Guida, M. (2011). Modeling non-performing loans probability in the commercial banking system: Efficiency and effectiveness related to credit risk in Italy. *Empirical Economics*, 41(2), 269-291.
- Maitah, M., Zedan, K., & Shibani, B. (2012). Factors Affecting the Usage Level of Financial Analysis by Credit Officers in the Credit Decision in Libyan Commercial Banks. *International Journal of Business and Social Science*, 3(10), 106-112
- Malekipirbazari, M., & Aksakalli, V. (2015). Risk assessment in social lending via random forests. *Expert Systems with Applications*, 42(10), 4631. doi:10.1016/j.eswa.2015.02.001
- Maloba, M., & Alhassan, A. L. (2019). Determinants of agri-lending in Kenya. *Agricultural Finance Review*, 79(5), 598-613.
- Manjula, C. (2016). Credit appraisal system in the banking sector. *ZENITH International Journal of Business Economics & Management Research*, 6(7), 11-15.
- Maraux, F. (2010). Sensitivity Analysis of Credit Risk Measures in the Beta Binomial Framework. *Journal of Fixed Income*, 19(3), 66-76. doi:10.3905/JFI.2010.19.3.066.
- Mare, D. S., Moreira, F., & Rossi, R. (2017). Nonstationary Z-score measures. *European Journal of Operational Research*, 260(1), 348-358.
- Maria, R., S., (2016). A new dynamic modeling framework for credit risk assessment." *Expert Systems with Applications*, 45, 341-351
- Marina, R. (2015). Finance for Agricultural: How to boost opportunities in developing countries. International Institute for Sustainable Development, Canada. Policy Brief, 3.
- Martin, S. J., & Clapp, J. (2015). Finance for agricultural or agricultural for finance? *Journal of Agrarian Change*, 15(4), 549-559.
- Mbroh, J. K., & Koomson, K. (2015). The Credit Policies and Credit Finance Creation Practices by Commercial Banks in Ghana: Perspectives of Staff and Clients of the Prudential Bank Limited. *International Journal of Economics, Finance and Management Sciences, USA*, 3(5), 441-452.
- McLeay, M., Radia, A., & Thomas, R. (2014). Money in the modern economy: An introduction. Bank of England Quarterly Bulletin, Q1.
- Mengze, H., & Wei, L. (2015). A comparative study on environment credit risk management of commercial banks in the Asia-Pacific region. *Business Strategy and the Environment*, 24(3), 159-174.
- Menkhoff, L., Neuberger, D., & Suwanaporn, C. (2006). Collateral-based lending in emerging markets: Evidence from Thailand." *Journal of Banking & Finance*, 30(1), 21.
- Mercylynne, M. W., & Omagwa, J. (2017). Credit Risk Management and Financial Performance Of Selected Commercial Banks In Kenya. *Journal of Business and Management (IOSR-JBM)*, 19(11), 92-98.

- Meulewaeter, M., & Candelon, B. (2020). Did financial stability improvements in the Euro area after Basel III be implemented and will it further improve under Basel IV? Thesis, Retrieved from <http://hdl.handle.net/2078.1/thesis:25893>
- Meutia, I., Adam, M., & Vegirawati, T. (2018). Comparative Analysis of Agricultural Finance in Some Countries. *Tazkia Islamic Finance and Business Review*, 11(1).
- Micah, E. E. M., Oyedokun, G. E., & Gimba, J. T. (2020). Audit committee characteristics and financial performance of listed manufacturing firms in Nigeria. *Journal of Forensic*, 5(2), 80.
- Michael, W. (2020). Assessing logistics capability for the Australian courier firms. *International Journal of Logistics Systems and Management*, 37(4), 576-589.
- Mihai, E. A. (2020). The role of Basel III monetary and financial activity. *Annals Constantin Brancusi'University of Targu-Jiu. Economy Series*, 2(3), 105-111
- Minnis, M., & Sutherland, A. (2017). Financial statements as monitoring mechanisms: Evidence from small commercial loans. *Journal of Accounting Research*, 55(1), 197-233.
- Mishkin, F. S. (2011). Over the Cliff: From the Subprime to the Global Financial Crisis. *Journal of Economic Perspectives*, 25(1), 49-70. doi:10.1257/jep.25.1.49
- Misman, F. N., & Bhatti, M. I. (2020). The determinants of credit risk: An evidence from ASEAN and GCC Islamic Banks. *Journal of Risk and Financial Management*, 13(5), 89.
- Misra, M. (2021). Commercial Micro-Credit, Neo-Liberal Agricultural and Smallholder Indebtedness: Three Bangladesh Villages. *Journal of Contemporary Asia*, 51(2), 330-350.
- MoF. (2018). Budget statement and economic policy. Ministry of Finance, Ghana
- MoFA. (2018). Food and Agricultural Sector Development Policy. MoFA: Ghana.
- MoFA. (2020). Report on sector performance. Retrieved from Accra, Ghana
- MoFA. (2021). *Report on sector performance*. Ministry of Finance and Agriculture, Ghana
- MoH. (2020). Report on the update of Covid-19 pandemic in Ghana. Accra, Ghana.
- Mokatsanyane, D., Muzindutsi, P., & Viljoen, D. (2017). Credit Risk and Securitisation in the South African Banking Sector. *ACTA UNIVERSITATIS DANUBIUS*, 13(2), 102-121
- Mole, S. A., & Namusonge, G. (2016). Factors affecting access to credit by small and medium enterprises: A case of Kitale Town. *The International Journal of Social Sciences and Humanities Invention*, 3(10), 2904-2917.
- Molefe, B., & Muzindutsi, P.-F. (2016). Effect of capital and liquidity management on profitability of major South African Banks. Proceedings of the 28th Annual Conference of the Southern African Institute of Management Scientists.
- Moloi, T. (2016). The nature of credit risk information disclosed in the risk and capital reports of the top-5 South African banks. *Banks & Bank Systems*, 11(3), 87-93.
- Monye, F. N., Nwafor, N., & Mukoro, B. (2020). Appraisal of the Nigerian Credit Reporting Act. *Journal of African Law*, 64(2), 229-243.
- Moradi, S., & Rafiei, F. M. (2019). A dynamic credit risk assessment model with data mining techniques: evidence from Iranian banks. *Financial Innovation*, 5(1), 15-27.
- Morgan, D. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1(1), 48-76.

- Moti, H. O., Masinde, J. S., Mugenda, N. G., & Sindani, M. N. (2012). Effectiveness of credit management system on loan performance: empirical evidence from the micro finance sector in Kenya. *International Journal of Business, Humanities, and Technology*, 2(6), 99-108.
- Muhammad, B., Khan, S., & Xu, Y. (2018). Understanding risk management practices in commercial banks: The case of the emerging market. *Risk Governance and Control. Financial Markets & Institutions*, 8(2), 54-62.
- Mulafara, A., H. (2015). An Analysis of Credit Risk Impact on Loan Performance - Evidence from Selected Commercial Banks. *International Journal of Innovative Research and Practices*, 3(12), 23-32. doi:www.forum4researchers.com
- Muninarayanappa, N. (2004). Credit Risk Management in Banks - Key Issues. *Journal of Accounting & Finance*, 18(1), 94-98.
- Muriithi, G., J., Waweru, K., M., & Muturi, M., M. (2016). Effect of Credit Risk on Financial Performance of Commercial Banks Kenya. *IOSR Journal of Economics and Finance (IOSR-JEF)*, 7(4), 72-83. doi:10.9790/5933-0704017283 www.iosrjournals.org
- Muro, M. B., Magutu, P., O. , & Getembe, K., N. (2013). The strategic benefits and challenges in the use of customer relationship management systems among commercial banks in Kenya. *European Scientific Journal, ESJ.*, 9(13), 327-349.
- Musyoki Danson, & Kadubo Adano Salad. (2012). The impact of credit risk management on the financial performance of Banks in Kenya for the period 2000 – 2006. *International Journal of Business and Public Management*, 2(2), 72-80.
- Mwangi, B. W., & Muturi, W. (2016). Effects of credit risk management on loan repayment performance of commercial banks in Kenya. *International Academic Journal of Economics and Finance*, 2(2), 1-24.
- Naresh, C., & Rao, B., R. (2015). Credit risk management practices of Indian Commercial Banks. *International Journal in Management & Social Science*, 3(1), 89-94.
- Nasieku, T., & Ngugi, R. W. (2016). Credit Information Sharing and Credit Risk Reduction in Kenya Commercial Banks. *Journal of Social Science Research*, 10(1), 1941-1949.
- Nawai, N., & Shariff, M. N. M. (2012). Factors affecting repayment performance in microfinance programs in Malaysia. *Procedia-Social and Behavioral Sciences*, 62, 806-811.
- Ndegwa, M. K., Shee, A., Turvey, C. G., & You, L. (2020). Uptake of insurance-embedded credit in presence of credit rationing: Evidence from a randomized controlled trial in Kenya. *Agricultural Finance Review*, 80(10), 745-766.
- Ndoka, S., & Islami, M. (2016). The impact of credit risk management in the profitability of Albanian commercial banks during the period 2005-2015. *European Journal of Sustainable Development*, 5(3), 445-445.
- Netzer, O., Lemaire, A., & Herzenstein, M. (2019). When words sweat: Identifying signals for loan default in the text of loan applications. *Journal of Marketing Research*, 56(6), 960-980.
- Nguyen, D. D., & Nguyen, A. H. (2020). The impact of cash flow statement on the lending decision of commercial banks: Evidence from Vietnam. *The Journal of Asian Finance, Economics, and Business*, 7(6), 85-93.

- Niazi, A. A. K., Azim, K., & Ahmed, K. (2012). Banks' performance enhancement: A framework for valid documentation of credits. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, 6(1), 147-157.
- Noman, A., H., Hossain, M., A. , & Pervin, S. (2015). An Investigation of Credit Risk Management Strategies of Private Commercial Banks of Bangladesh. *Global Journal of Business and Social Science Review, GJBSSR, Vol. 3 (1)*, (2289-8506).
- Norman, O., & Larry, H. (2014). *A step-by-step approach to using SAS for factor analysis and structural equation modeling, 2nd ed.*, Cary North Carolina, USA: SAS Institute Inc.
- Nunnally, J., C., & Bernstein, I., H. (1997). *Psychometric Theory*. New York, McGraw-Hill.
- Nwankwo, F. O. (2017). Factors Affecting Access to Agricultural Loans in Anambra State: An Econometric Analysis. *Asian Journal of Economics, Business, and Accounting*, 4(3), 1-8.
- Nwude, E., K., & Okeke, C. (2018). Impact of Credit Risk Management on the Performance of Selected Nigerian Banks. *International Journal of Economics and Financial.*, 8(2), 298.
- O'Har, J. P., Senesi, C. W., & Molenaar, K. R. (2017). Development of a risk register spreadsheet tool for enterprise-and program-level risk management. *Transportation Research Record*, 2604(1), 19-27.
- Obilor, S. I. (2013). The impact of commercial banks' credit to agricultural on agricultural development in Nigeria: An econometric analysis. *International Journal of Business, Humanities, and Technology*, 3(1), 85-94.
- Obuobi, B., Nketiah, E., Awuah, F., & Amadi, A. G. (2019). Recapitalization of banks: Analysis of the Ghana banking industry. *Open Journal of Business and Management*, 8(01), 78.
- Odonkor, A. A. (2018). An Assessment of Credit Risk Management Practices of Adansi Rural Bank Limited. *International Journal of Economics and Finance*, 10(11), 110.
- OECD. (2019). Due Diligence for Responsible Corporate Lending and Securities Underwriting: Key considerations for banks implementing the OECD Guidelines for Multinational Enterprises. Retrieved from <https://www.oecd.org/investment/due-diligence>
- Ofori-Nyarko, E. (2017). The effect of supply chain management on firm performance: The case of selected commercial banks in Ghana. *Pentvars Business Journal*, 10(2), 27-42.
- Ogboi, C., & Unuafe, O. K. (2013). Impact of credit risk management and capital adequacy on the financial performance of commercial banks in Nigeria. *Journal of Emerging Issues in Economics, Finance, and Banking*, 2(3), 703-717.
- Okafor, C. A. (2020). Commercial banks credit and agricultural development in Nigeria. *International Journal of Business & Law Research*, 8(3), 89-99.
- Olabamiji, O., & Michael, O. (2018). Credit management practices and bank performance: Evidence from First Bank. *South Asian Journal of Social Studies and Economics*, 1(1), 1-10. doi:10.9734/sajsse/2018/v1i125772
- Oladeebo, J., & Oladeebo, O. (2008). Determinants of loan repayment among smallholder farmers in Ogbomoso agricultural zone of Oyo State, Nigeria. *Journal of Social Sciences*, 17(1), 59-62.

- Olalekan, A., & Adeyinka, S. (2013). Capital adequacy and banks' profitability: An evidence from Nigeria. *American International Journal of Contemporary Research*, 3(10), 87.
- Olawale, L., S. (2015). The effect of credit risk on the performance of commercial banks in Nigeria. *African Journal of Accounting, Auditing and Finance*, 4(1), 53-73. doi:10.1504/AJAAF.2015.071754
- Oliveira, J., Rodrigues, L. L., & Craig, R. (2011). Risk-related disclosure practices in the annual reports of Portuguese credit institutions: an exploratory study. *Journal of Banking Regulation*, 12(2), 100-118.
- Ollennu, N. A. (1962). *Principles of Customary Land Law in Ghana* (Vol. 2). London: Sweet & Maxwell.
- Olutunla, G. T., & Obamuyi, T. M. (2008). An empirical analysis of factors associated with the profitability of Small and medium enterprises in Nigeria. *African Journal of Business Management*, 2(11), 195-200.
- Ongallo, T. A., Gesami, P., & Mwaniki, D. (2019). Loan Portfolio Quality Diversification Factor, Loan Syndication and Financial Performance of Commercial Banks in Kenya. *Gillian, Loan Portfolio Quality Diversification Factor, American Based Research Journal*, 8(05), 61-68.
- Onuko, L. K., Muganda, M., & Musiega, D. (2015). Effect of credit risk management on loan portfolio quality of tier one commercial banks in Kenya. *International Journal of Business and Management Invention*, 4(7), 46-53.
- Onyiriuba, L., Okoro, E. O., & Ibe, G. I. (2020). Strategic government policies on agricultural finance in African emerging markets. *Agricultural Finance Review*, 80(4), 563-588.
- Osafo, B. T., & Ameh, S. O. (2020). Housing Policies: The Experiences and Constraints of Housing Industry in Ghana. *Advances in Social Sciences Research Journal*, 7(9), 416-434.
- Osayi, V., I., Dibal, H., S., & Ezuem, M., D. (2019). Risk Management Approach and Banks' Portfolio Investment Performance in Nigeria. *Research Journal of Finance and Accounting*, 10(6), 81-91. doi:10.7176/RJFA
- Osiogbu, P. I. (2006). The Level of Commercial Bank's Compliance with CBN Monetary Policy Credit Guidelines. *Journal of Social Sciences*, 13(1), 11-14.
- Otwori, C. (2013). The relationship between Credit Referencing and the Level of nonPerforming Loans of Commercial Banks in Kenya. *International Journal of Business, Humanities, and Technology*, 2(4), 31-43.
- Ouma, S. (2016). From financialization to operations of capital: Historicizing and disentangling the finance-farmland-nexus. *Elsevier*, 72, 82-93. Retrieved from <https://www.sciencedirect.com/science/article>
- Owojori, A. A., Akintoye, I., R., & Adidu, F., A. (2011). The challenge of risk management in Nigerian banks in the post-consolidation era. *Journal of Accounting and Taxation*, 3(2), 23-31.
- Owusu-Antwi, G. (2009). Impact of Financial Reforms on the Banking System in Ghana. *International Business & Economics Research Journal*, 8(3), 77-100.
- Oyetade, D., Obalade, A. A., & Muzindutsi, P.-F. (2020). Impact of the Basel IV framework on securitisation and performance of commercial banks in South Africa". *"Banks and Bank Systems", Consulting Publishing Company "Business Perspectives"*, 15(3), 95-105. doi:10.21511/bbs.15(3).2020.09

- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533-544.
- Parchimowicz, K., & Spence, R. (2020). Basel IV Postponed: A Chance to Regulate Shadow Banking? *Erasmus Law Review*(2), 1-32
- Pasha, S. A. M., & Negese, T. (2014). Performance of loan repayment determinants in Ethiopian micro finance-An analysis. *Eurasian Journal of Business and Economics*, 7(13), 29-49.
- Pathan. (2009). "Strong boards, CEO power, and bank risk-taking". *Journal of Banking and Finance*. 1340-1350., 33(7), 1340-1350.
- PBL. (2020). *Annual financial report*. Retrieved from <https://www.prudentialbank.com.gh>
- Peprah, W. K., Agyei, A., & Oteng, E. (2017). Ranking the 5C's Of credit analysis: evidence from ghana banking industry. *Int J Innovative Res Adv Stud (IJIRAS)*, 4(9), 78-80.
- Pham, H. N. (2021). How does internal control affect bank credit risk in Vietnam? A Bayesian analysis. *The Journal of Asian Finance, Economics, and Business*, 8(1), 873-880.
- Philippon, T. (2015). Has the US finance industry become less efficient? On the theory and measurement of financial intermediation. *American Economic Review*, 105(4), 1408-1438.
- Popović, S., Janković, I., & Žaklina, S. (2018). The importance of bank credits for agricultural finance in Serbia. *Economics of Agricultural*, 65(1), 65-80.
- Poudel, R., & Prakash, S.. (2012). The impact of credit risk management on the financial performance of commercial banks in Nepal. *International Journal of Arts and Commerce*, 1(5), 9-15.
- Powell, J. H., Mustafee, N., Chen, A., & Hammond, M. (2016). System-focused risk identification and assessment for disaster preparedness: Dynamic threat analysis. *European Journal of Operational Research*, 254(2), 550-564.
- Pozo, F., Arruga, I., Mujica, L. E., Ruiz, M., & Podivilova, E. (2016). Detection of structural changes through principal component analysis and multivariate statistical inference. *Structural Health Monitoring*, 15(2), 127-142.
- Prashant, K., & Kavita, K. (2016). Credit risk management system and framework in the banking sector. *International Journal of Management and Social Science Research Review*, 1(1), 131.
- PWC. (2020). *Ghana Banking Survey 2020. The new normal: Banks' response to COVID-19*. Retrieved from Accra, Ghana: <http://www.pwc.com-assets>
- Rahji, M., & Fakayode, S. (2009). A multinomial logit analysis of agricultural credit rationing by commercial banks in Nigeria. *International Research Journal of Finance and Economics*, 24(91), 97-103.
- Randall, D., Hughes, J., O'Brien, J., Rouncefield, M., & Tolmie, P. (2001). 'Memories are made of this': Explicating organizational knowledge and memory. *European Journal of Information Systems*, 10(2), 113-121.
- Rao, o., Liu, M., Goh, M., & Wen, J. (2020). 2-stage modified random forest model for credit risk assessment of P2P network lending to "Three Rurals" borrowers, *Applied Soft Computing*, Elsevier, 95. doi:10.1016/j.asoc.2020.106570.

- Razman, A. A., & Safian, Y. H. M. (2019). Current Practice of Debt Recovery Methods In Islamic Banks In Malaysia. *al-Qanatir: International Journal of Islamic Studies*, 13(2), 93-110.
- Richard, E., Chijoriga, M., Kaijage, E., Peterson, C., & Bohman, H. (2008). Credit risk management system of a commercial bank in Tanzania. *International Journal of Emerging Markets, Emerald Insight*, 3(3), 323-332.
- Ristić, L., Todorović, V., & Jakšić, M. (2018). Limitations and opportunities for funding agricultural and rural development in the Republic of Serbia. *Економика пољопривреде*, 65(3).
- Rodina, L., A., Zavadskaya, V., V., & Kurchenko, O., V. (2013). Credit risk management. Omsk University, Proceedings, 3.
- Romanova, I. (2012). Bank lending and Crisis: Case of Latvia. *Journal of Business Management*, 5, 72-97.
- Roslan, A. H., & Karim, M. Z. (2009). Determinants of microcredit repayment in Malaysia: The case of Agrobank. *Humanity & Social Sciences Journal*, 4(1), 45-52.
- Rouder, J. N., Morey, R. D., Speckman, P. L., & Province, J. M. (2012). Default Bayes factors for ANOVA designs. *Journal of Mathematical Psychology*, 56(5), 356-374.
- Rozhkova, A. (2021). Features and problems of lending to agricultural enterprises. Paper presented at the IOP Conference Series: Earth and Environmental Science 677, 022045, Russia.
- Rufo, M., & John, P., R. . (2017). The Effect of Credit Risk and Capital Adequacy on the Profitability of Rural Banks in the Philippines. *Scientific Annals of Economics and Business*, 64(1), 83-96. doi:<https://doi.org/10.1515/saeb-2017-0006>
- Ryan, D. (2020). Restating Restraint of Trade: The Implications of the Supreme Court's Judgment in *Tillman v Egon Zehnder Ltd*. *Industrial Law Journal*, 49(4), 595-608.
- Sackey, F. G. (2018). Is there discrimination against the agricultural sector in the credit rationing behavior of commercial banks in Ghana? *Agricultural Finance Review*, 78(3), 348-363.
- Saito, K., & Tsuruta, D. (2018). Information asymmetry in small and medium enterprise credit guarantee schemes: evidence from Japan. *Applied Economics*, 50(22), 2469-2485.
- Salami, K. A., & Larmie, M. (2013). Effectiveness of Bank of Ghana's Regulation and Supervision of Banks in Ghana. *Standard Research Journal of Business Management.*, 1(3), 73-81.
- Samuel, O. L. (2015). The effect of credit risk on the performance of commercial banks in Nigeria. *African Journal of Accounting, Auditing, and Finance*, 4(1), 29-52.
- SAP's. (2020). *Ratings*. Retrieved from www.spglobal.com/ratings.
- Saruni, L. A., & Koori, J. (2020). Credit Information Sharing and Default Rate of Loans Issued by Commercial Banks Listed at the Nairobi Securities Exchange. *Journal of Finance and Accounting*, 4(5), 1-24.
- SBG. (2020). *Annual financial report*. Retrieved from www.stasnbicbank.com.gh.
- Scannella, E., & Polizzi, S. (2021). How to measure bank credit risk disclosure? Testing a new methodological approach based on the content analysis framework. *Journal of Banking Regulation*, 22(1), 73-95.
- Serwadda, I. (2018). Impact of credit risk management systems on the financial performance of commercial banks in Uganda. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 66(6), 1627-1635.

- Shee, A., & Turvey, C. G. (2012). Collateral-free lending with risk-contingent credit for agricultural development: indemnifying loans against pulse crop price risk in India. *Agricultural Economics*, 43(5), 561-574.
- Sher, A., Mazhar, S., Azadi, H., & Lin, G. (2021). Smallholder Commercialisation and Urban-Rural Linkages: Effect of Interest-Free Agricultural Credit on Market Participation of Rice Growers in Pakistan. *Land*, 10(1), 7.
- Shuaibu, M., & Nchake, M. (2021). Impact of credit market conditions on agricultural productivity in Sub-Saharan Africa. *Agricultural Finance Review*, 81(4), 520-534
- Shungu, P., Ngirande, H., & Ndlovu, G. (2014). Impact of corporate governance on the performance of commercial banks in Zimbabwe. *Mediterranean Journal of Social Sciences*, 5(15), 93-105
- Sidhu, R., & Gill, S. S. (2006). Agricultural credit and indebtedness in India: Some issues. *Indian Journal of Agricultural Economics*, 61(1), 11-35
- Simovic, V., Vaskovic, V., & Poznanovic, D. (2009). A model of a credit bureau in Serbia. An instrument for preserving the stability of the banking sector in conditions of the global economic crises. *Journal of Applied Quantitative Methods*, 4(4), 429-439.
- Singh, A. (2013). Components of credit risk. Considering a comprehensive credit strategy. Boston, MA: Irwin/McGraw-Hill.
- Sinha, M. (2019). Frictions in the transmission of interest rate cuts from the central bank to commercial banks in India. An inquiry. *International Journal of Management Practice*, 12(4), 495-510.
- Siti, N. Y., Nusaibah, M., & Kazuhiro, O. (2016). Financial Performance and Economic Impact on Capital Adequacy Ratio in Japan. *International Journal of Business and Management*, 11(4), 14-21.
- Solojentsev, E., D. . (2004). Scenario Logic and Probabilistic Management of Risk in Business and Engineering. 2nd Ed, Springer.
- Stefanelli, V., & Cotugno, M. (2012). An empirical analysis onboard monitoring role and loan portfolio quality measurement in banks. *Academy of Banking Studies Journal*, 11, 2-29.
- Stiglitz, J., E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review*, 71 (3), 393-410.
- Stiroh, K. J. (2006). A portfolio view of banking with interest and noninterest activities. *Journal of Money, Credit and Banking*, 38(5), 1351-1361.
- Switzer, L. N., & Wang, J. (2013). Default risk estimation, bank credit risk, and corporate governance. *Financial Markets, Institutions & Instruments*, 22(2), 91-112.
- Taher, F. M., & Saeed, A. P. A. B. (2020). The Effect of Deposits on Cash Credit: An analytical study in a sample of private Iraqi commercial banks For the period 2004-2018. *Tikrit Journal of Administration and Economics Sciences*, 16(49 part 1), 204-215.
- Taherdoost, H. (2016). Validity and reliability of the research instrument: How to test the validation of a questionnaire/survey in research. *International Journal of Academic Research in Management*, 5(3), 28-36.
- Taiwo, J., Ucheaga, E., Achugamonu, B. U., Adetiloye, K., Okoye, O., & Agwu, P. E. (2017). Credit risk management: Implications on bank performance and lending growth. *Saudi Journal of Business and Management Studies*, 2, 584-590.
- Tandon, D., & Batra, A. (2014). Credit risk analysis – New horizon in the Indian Banking Sector. *Asian Journal of Research in Banking and Finance*, 4(1), 158-180.

- Tchamyou, V. S. (2019). The role of information sharing in modulating the effect of financial access on inequality. *Journal of African Business* 20(3), 317-338.
- Thakor, A. V. (2016). The highs and the lows: A theory of credit risk assessment and pricing through the business cycle. *Journal of Financial Intermediation*, 25, 1-29.
- Tomak, S. (2013). Determinants of commercial banks' lending behavior: Evidence from Turkey. *Asian Journal of Empirical Research*, 3(8), 933-943.
- Torbira, L., & Land Zaagha, A. S. (2016). Capital Adequacy Measures and Bank Financial Performance in Nigeria: A Cointegration Analysis. *Journal of Finance and Economic Research*, 3(1), 15-34.
- Tran, S. H., & Nguyen, L. T. (2020). Financial Development, Business Cycle and Bank Risk in Southeast Asian Countries. *Journal of Asian Finance, Economics, and Business*, 7(3), 127-135. doi:10.13106/jafeb.2020.vol7.no3.127
- Ubarhande, P., & Chandani, A. (2021). Elements of Credit Rating: A Hybrid Review and Future Research Agenda. *Cogent Business & Management*, 8(1).
- Udom, I. S., & Onyekachi, R. E. (2018). Effect of Capital Adequacy Requirements on the Profitability of Commercial Banks in Nigeria. *International Research Journal of Finance and Economics*(165), 79-89
- Unterrainer, J., Rahm, B., Kaller, C., & Wild, P., S. (2019). Assessing Planning Ability Across the Adult Life Span in a Large, Population-Representative Sample: Reliability Estimates and Normative Data for the Tower of London (TOL-F) Task. *Journal of the International Neuropsychological Society*, 25, 520-529.
- Vallee, B., & Zeng, Y. (2019). Marketplace lending: A new banking paradigm? *The Review of Financial Studies*, 32(5), 1939-1982.
- Vashishtha, R. (2014). The role of bank monitoring in borrowers' discretionary disclosure: Evidence from covenant violations. *Journal of Accounting and Economics*, 57(2-3), 176-195.
- Vidyarthi, H., & Tiwari, R. (2019). Cost, revenue, and profit efficiency characteristics, and intellectual capital in Indian Banks. *Journal of Intellectual Capital* 22(1), 1-22
- Wachira, A. K. (2017). Effects of credit risk management practices on loan performance of commercial banks in Nyeri County, Kenya. *European Journal of Economic and Financial Research*, 2(2). doi:10.5281/zenodo.572281
- Wang, F., Rob, K., & Nigel, T. (2009). Factor Analysis and Principal-Components Analysis. *International Encyclopedia of Human Geography*. Oxford: Elsevier.
- Wang, Y., Wang, W., & Wang, J. (2017). Credit risk management framework for rural commercial banks in China. *Journal of Financial Risk Management*, 6(01), 30-48.
- Wanjohi, A. (2016). Analysis of the effect of credit risk management on profitability of commercial banks in Kenya. *International Journal of Finance and Accounting. IPRJ*, 1(2), 61. doi:www.iprjb.org
- Warue, B. N. (2013). The effects of bank-specific and macroeconomic factors on nonperforming loans in commercial banks in Kenya: A comparative panel data analysis. *Advances in Management and Applied Economics*, 3(2), 135-164.
- WBR. (2013). *World Development Report: Risk and Opportunity Managing Risk for Development*. Retrieved from Washington, DC. <https://elibrary.worldbank.org/doi/abs/10.1596/978-0-8213-9903-3>.
- Weber, R., & Musshoff, O. (2017). Can flexible agricultural microfinance loans limit the repayment risk of low diversified farmers? *Agricultural Economics*, 48(5), 537-548.

- Wersland, R., & Strom, O., R. (2009). Performance and governance in microfinance Institutions. *Journal of Banking and Finance, Elsevier*, 33(4), 662-669.
- Wood, A., & Skinner, N. (2018). Determinants of non-performing loans: Evidence from commercial banks in Barbados. *The Business & Management Review*, 9(3), 44-64.
- Wubin, S., Arthur, J., & Agyapong, E., K. (2020). Finance SMEs In Ghana: Evidence of the optimal guarantee ratio. Paper presented at the Conference on Interdisciplinary Business and Economics Research, Sydney, Australia.
- Yaseen, S., Ghaleb., & Qirem, I., A., E. (2018). Intention to use e-banking services in the Jordanian commercial banks. *International Journal of Bank Marketing*, 36(2). doi:10.1108/IJBM-05-2017-0082
- Yeung, G. (2009). How banks in China make lending decisions. *Journal of Contemporary China*, 18(59), 285-302.
- Yin, Z., Meng, L., & Sha, Y. (2020). Determinants of agricultural-related loan default: Evidence from China. *Buletin Ekonomi Moneter Dan Perbankan*, 23, 129-150.
- Yoshino, N., & Taghizadeh-Hesary, F. (2018). Optimal Credit Guarantee Ratio small and medium-sized enterprises' finance: Evidence from Asia. *Economic Analysis and Policy*. Tokyo: Asian Development Bank Institute. DOI: 10.1016/j.eap.2018.09.011
- Zafar, M. A., Khan, K., Roberts, K. W., & Zafar, A. M. (2015). Local agricultural finance and Islamic banks: is Qard-al-Hassan a possible solution? *Journal of Islamic Accounting and Business Research*, 6(1), 122-147.
- Zamore, S., Beisland, L., Atle., & Mersland, R. (2019). Geographic diversification and credit risk in microfinance. *Journal of Banking & Finance, Elsevier*, 109. doi:10.1016/j.jbankfin.2019.105665
- Zia Ur, R., Noor, M, Bilal, S., & Muhammad, A., (2019). Impact of risk management strategies on the credit risk faced by commercial banks of Balochistan. *Financial Innovation*, 5(44), 154-160, doi.org/10.1186/s40854-019-0159-8

Appendix 1: Questionnaire and Interview Guides

Part A: Demographic Information

D1. Kindly indicate your Sex: Male { } Female { } Prefer not to answer { }

D2. Kindly indicate your years of experience: 1-2 { } 3-4 { } 5 and above { }

D3. Indicate the name of your Bank: Stanbic Bank Ghana Ltd { } Ecobank Ghana Ltd { } GCB Bank Ltd { } Prefer not to answer { }

D4. Indicate your qualification: SHS/Diploma { } HND { } Degree { } Masters { } Doctoral { }

PART B: Credit Risk Identification Methods

Please indicate how often these methods are used to identify risk in your bank. Apply and use the rating/measurement system in your bank on a scale of 1-5 where;

1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Very Often 5 = Always

NO.	Credit Risk Identification Methods	1	2	3	4	5
M1	A sensitivity analysis method is used to identify credit risk					
M2	The credit portfolio view method is used to identify credit risk					
M3	External audit checks are used to identify risk					
M4	Internal Audit checks are used to identify risk					
M5	An objective-based approach is used to identify credit risk					
M6	A scenario-based method is used to identify credit risk (knowing what can happen and the risk involved)					
M7	Credit Bureau reports are used to identify credit risk.					
M8	Tax returns for self-employed borrowers are used to identify credit risk.					
M9	A chart-based approach is used to identify credit risk					
M10	The risk management review process is used to identify credit risk					
M11	Consultative reviews from third parties are used to identify credit risk.					
M12	The Independent agency review approach is used to identify credit risk					
M13	Loan syndication method such as collaborating with other lenders to give loans to borrowers is used to identify credit risk					
M14	Credit Rationing methods such as actions taken to limited borrowers are employed to identify risk					
M15	Credit rating method such as predicting the ability to pay back the loans is used to identify credit risk					
M16	Z-score model, a mathematical approach that identifies the possibility of credit risk is used to identify credit risk					
M17	An instance-based method such as evaluating the returns and risk of individual loans is used to identify credit risk					

Part C: Effectiveness of the Implementation of Credit Risk Management Policies

Please indicate how often these policies are implemented in your bank to mitigate risks.

Please indicate the extent to which your bank relies on the following in the implementation of decisions. Applying and using the rating/measurement system in your bank on a scale of 1-5 where;

1 = Never, 2 =seldom, 3 =sometimes, 4 = very often 5 = always

NO.		1	2	3	4	5
P1	Loan appraisal processes are applied in the granting of credits.					
P2	Loan authorization procedures are followed in the granting of credits.					
P3	Application of the loan approval process.					
P4	A credit limit review of borrowers is applied in the granting of credits.					
P5	Collateral is required in the granting of credits					
P6	Loans are insured with insurance companies or agents against possible losses					
P7	Loans are guaranteed based on borrowers' capacity					
P8	Borrowers' creditworthiness is appraised before granting credits.					
P9	Restrictive covenants are effectively enforced in granting loans.					
P10	The credit register is assessed before granting credits					
P11	The character of borrowers is considered in the granting of credits.					
P12	Credit manuals are used in the granting of credits.					
P13	The credit history of the borrower is considered in the granting of credits.					
P14	A credit disbursement review covers compliance with internal guidelines.					
P15	Compliance with relevant laws and regulations is monitored in the credit granting process.					

Part D: Effectiveness of Credit Risk Mitigation Strategies

Please indicate the extent to which the following practices have been used by your institution in mitigating credit risks. Applying and using the rating/measurement system in your bank on a scale of 1-5 where;

1 = Never, 2 =seldom, 3 =sometimes, 4 = very often 5 = always

No.	Credit Risk management Strategies	1	2	3	4	5
S1	Credit Officers regularly Identify loan distress signals.					
S2	The loan granting processes are regularly reviewed.					
S3	There is a regular review of loan portfolio quality.					
S4	Employees' credit skills are regularly reviewed.					
S5	The credit administration process is regularly reviewed.					
S6	Borrowers' credit reports are regularly reviewed.					
S7	Borrowers' performance profile is regularly reviewed.					
S8	All credit-related transactions are properly documented.					
S9	Collateralized transactions are regularly monitored.					
S10	Credit department checks that loans are repaid on time					
S11	The credit department regularly identifies loans with potential credit weaknesses that can cause repayment problems					
S12	The overall quality of the loan portfolio is assessed on a timely basis					
S13	Credit Officers are regularly trained.					
S14	Risk management practices are regularly reviewed.					
S15	The flow of the borrowers' business is regularly monitored.					
S16	Credit risk management guidelines are regularly communicated.					
S17	Loans are guaranteed by the Government or credit associations					

Part E: Interview Guide to Commercial Banks on Credit Risk Management Strategies in Agricultural Finance

1. Factors that are considered by Commercial Banks in agricultural lending.
2. Approval and authorization procedures in the granting of loans for agricultural activities.
3. Challenges faced by Commercial Banks in agricultural finance/lending.
4. Challenges faced by Commercial Banks in the implementation of credit risk management policies.
5. Roles played by experience and qualification in the appointment of credit officers.
6. Possible best strategies that can be used by Commercial Banks to mitigate credit risk in agricultural finance

Appendix 2A: Ethical Clearance



27 August 2020

Mr Abraham Nyebar (217079802)
School Of Acc Economics&Fin
Westville Campus

Dear Mr Nyebar,

Protocol reference number: HSSREC/00001582/2020

Project title: Effects of credit risk management practices of commercial banks on agriculture financing in Ghana
Degree: PhD

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 30 June 2020 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

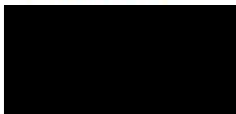
This approval is valid until 27 August 2021.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,



Professor Dipane Hlalele (Chair)

/dd

Humanities & Social Sciences Research Ethics Committee
UKZN Research Ethics Office Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Tel: +27 31 260 8350 / 4557 / 3587
Website: <http://research.ukzn.ac.za/Research-Ethics/>

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

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Appendix 2B: Ethical Clearance-Change of Title



27 September 2021

Abraham Nyebar (217079802)
School of Acc, Economics and Finance
Westville

Dear Mr Nyebar

System Nr: HSSREC/00001582/2020

Project title: Effectiveness of credit risk management practices of Ghanaian commercial banks in agricultural finance.

Approval Notification – Amendment Application

This letter serves to notify you that your application and request for an amendment received on Date 2020 has now been approved as follows:

- Change in Title

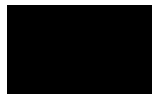
Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form; Title of the Project, Location of the Study must be reviewed and approved through an amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

Best wishes for the successful completion of your research protocol.

Yours faithfully

Prof Josue Mbonigaba



Date 27 sept 2021

.....
ACADEMIC LEADER RESEARCH

/___

Humanities & Social Sciences Research Ethics Committee
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Postal Address: Private Bag X54001, Durban 4000
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Website: <http://research.ukzn.ac.za/Research-Ethics/>

Founding Campuses: ■ Edgewood ■ Howard College ■ Medical School ■ Pietermaritzburg ■ Westville

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Appendix 3: Turnitin Report

