Operational risk management guidelines for Ghanaian banks to advance Basel III compliance

by

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Declaration

I declare that this thesis entitled "Operational risk management guidelines for Ghanaian banks to enhance Basel III compliance" is my own work and that all the sources I used or quoted have been indicated and acknowledged by means of complete references. I further declare that I have not submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

2023/01/17

SIGNATURE
(Mr G.P.M. Grebe)

DATE

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Abstract

The 2007-2008 global financial crisis (GFC) exposed the shortcomings and inefficiencies of the global banking system, and these weaknesses were not limited to only one country or economy. In addition, the financial crisis shook the faith of governments and investors in banking systems across the globe; this faith has yet to be restored.

To address the problems in the global banking system, the Basel Committee on Banking Supervision (BCBS) published the Basel III regulatory framework (Basel III) to improve the resilience of banks and enhance the financial stability and sustainability of the global financial system. Research furthermore confirmed that banks' ineffective operational risk management practices were one of the principal causes of the 2007-2008 GFC. However, the Basel III operational risk management requirements were primarily designed for internationally active banks and add considerable complexity to banks' operations, making it exceptionally challenging for them to comply with its requirements, particularly for banks operating in developing African countries.

However, the Ghanaian banking sector, experienced another banking crisis in 2018 and has since been focused on implementing the requirements of Basel II. Unfortunately, Ghanaian banks find implementing the Basel III operational risk management requirements challenging because of its complexity, high compliance cost, poor supervisory guidance, cultural issues, poor risk governance, and a lack of human resources. Therefore, this study was to assist Ghanaian banks in improving their operational risk management practices and increasing their level of compliance with the operational risk management requirements of Basel III and consequently experience improvements in their risk resilience, financial stability and sustainability.

The empirical analyses were based on survey data collected through a self-designed questionnaire distributed among Ghanaian bank personnel with specialised knowledge and experience in operational risk management, risk governance and compliance, bank supervision and implementing the Basel regulatory frameworks. The data analyses included descriptive- and inferential statistical techniques, by means of the Mann-Whitney U test, Fisher's exact test and multiple regression analysis.

The findings indicated that Ghanaian banks could enhance their level of operational risk management compliance by improving their risk governance and risk culture infrastructures, as these key improvements will increase the optimal functioning of their operational risk management practices. By implementing the guidelines provided by the study, Ghanaian banks will enhance their level of compliance with the Basel III regulatory framework and therefore also experience improvements in the financial stability and sustainability of the country's banks.

Keywords

Operational risk, Ghana, risk culture, risk governance, risk management, Basel regulatory frameworks, prudential banking regulation, regulatory compliance, Basel III, developing countries, financial stability.

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List of Abbreviations

ALCO	Asset-liability management committee
ALM	Asset-liability management
AMA	Advanced measurement approach
ASA	Alternative standardised approach
BCBS	Basel Committee on Banking Supervision
BIA	Basic indicator approach
BIS	Bank for International Settlements
CCF	Credit conversion factors
CCR	Counterparty credit risk
CEO	Chief Executive Officer
COO	Chief operating officer
COSO	Committee of Sponsoring Organisations
CRO	Chief risk officer
EC	Economic capital
EIB	European Investment Bank
EMH	Efficient market hypothesis
ERM	Enterprise risk management
FSB	Financial Stability Board
GFC	Global financial crisis
GI	Gross income
GIZ	Gesellschaft fur Internationale Zusammenarbeit
HQLA	High-quality liquid assets
IBM	International Business Machines
ICAAP	Internal capital adequacy assessment process
ICT	Information and Communication Technology
IFC	International Finance Corporation
IfW	Institute for the World
IIF	Institute of International Finance

IMA	Internal-models approach
IMF	International Monetary Fund
IRB	Internal ratings-based
IRRBB	Interest rate risk in the banking book
IT	Information technology
KNUST	Kwame Nkrumah University of Science and Technology
KPI	Key performance indicators
KRI	Key risk indicators
LCR	Liquidity coverage ratio
LGD	Loss-given-default
NDC	National Democratic Congress
NPP	New Patriotic Party
NSFR	Net stable funding ratio
OECD	Organization for Economic Cooperation and Development
ORD	Operational risk management department
PD	Probability of default
PwC	PricewaterhouseCoopers
RC	Regulatory capital
ROE	Return on equity
RWA	Risk-weighted assets
SA	Standardised approach
SAFE	Sustainable Architecture for Finance in Europe
SME	Small and medium enterprises
SPSS	Statistical Package for the Social Sciences
SREP	Supervisory Review and Evaluation Process
TSA	The standardised approach
UCC	Unconditionally cancellable commitments
VaR	Value-at-risk
VIF	Variance inflation factor

Chapter 1 - Introduction and background

1.1 Introduction

Economic systems worldwide are still dealing with the repercussions of the 2007-2008 global financial crisis (GFC). This financial crisis highlighted the weaknesses and inadequacies of the global banking system, and these shortcomings were not limited to only one country or economy. In addition, the GFC has shaken the faith of both governments and investors in the banking system, and this faith has yet to be restored (Cronje & Van Rooyen, 2013; Samitas & Polyzos, 2015; Nyantakyi & Sy, 2015).

In response to the GFC of 2007-2008, the Basel III regulatory framework was published by the Basel Committee on Banking Supervision (BCBS) in December 2010 (Gomes & Khan, 2011; Mostert, 2013). The new regime adopted in this framework requires a much greater integration of finance- and risk management functions. It became clear that the greater convergence in the measurement of capital adequacy requirements was not a sufficient measure for ensuring the financial stability and resilience of banking systems, so this regulatory framework aimed to improve the liquidity base and risk management practices of banking institutions (Gomes & Khan, 2011; Mostert, 2013; Naceur & Kandil, 2008; Schoenbaum, 2012; Tarullo, 2011).

However, supervisory authorities and bank regulators should be aware that the Basel III regulatory framework was designed primarily for internationally active banking institutions and is not optimal for smaller and less sophisticated banks (Bank for International Settlements (BIS), 2014e; Dietrich, Sigrist & Wanzenried, 2017; Frait & Tomsik, 2014; Frait & Komarkova, 2013).

As the Bank for International Settlements (BIS) noted, the Basel III regulatory framework may pose implementation challenges to banking institutions operating in developing economies, such as Ghana, owing to the limited availability of high-quality liquid assets and the difficulties in calibrating the framework to suit the banking operations of these banks (BIS, 2014f, Tsamela, 2016).

Banking institutions have raised complaints that the requirements of the Basel II- and III regulatory frameworks are difficult to implement because of their complexity and the high compliance costs (American Bankers Association, 2011; Blundell-Wingnall, Atkinson & Roulet, 2014; Dietrich *et al*., 2017; Veron, 2014). Veron (2014) stated that the shortcomings in the capacity and governance of banks in developing countries hinder the proper implementation of the Basel II- and III regulatory frameworks' requirements. Additionally, banking institutions in developing countries, particularly those operating in Africa, do not have the necessary resources (capital and expertise) to adhere to these requirements (Liste, Kolster & Matondo-Fundani, 2012; Nyantakyi & Sy, 2015; Vernon, 2014). Their banking operations differ considerably in scope and complexity, further complicating the task of complying with the requirements of the Basel III regulatory framework (Liste *et al*., 2012; Griffith-Jones & Gottschalk, 2016; Nyantakyi & Sy, 2015; Veron, 2014, Tsamela, 2016).

The potential impact on market fragmentation because of inconsistent and non-compliance with the Basel III requirements among developed and developing countries include the following (De Cos, 2020):

- It can lead to an uneven playing field among banking institutions and result in a race to the bottom in regulatory standards and supervisory practices, which may, in turn, adversely affect the safety and soundness of banking systems across the globe.
- Banks operating in countries that have not implemented the Basel III requirements consistently may overstate their capital and liquidity ratios – which can erode comparability across banks and impair market discipline.
- It may increase the operational costs and complexity for internationally active banks.

Only consistent and sufficient implementation of the Basel III regulatory framework's requirements will produce optimal results to strengthen the financial stability and sustainability of the global financial system. In light of the implementation challenges that banking institutions are facing, especially banking institutions operating in developing

countries, solutions are required to assist banks in implementing these requirements successfully.

1.2 History of the Ghanaian banks

The first bank to open in Ghana was the Bank of British West Africa in 1896. After that (between 1896 and 1953), the Colonial Bank, the National Bank of South Africa, Barclays Bank, and the Anglo-Egyptian Bank followed. During these years, Ghanaian banking was dominated by international banks, which, unfortunately, focused primarily on moving capital out of the country instead of reinvesting in Ghana (Akolgo, 2022). Although the first indigenous bank, The Ghana Commercial Bank, opened in 1953, it was under the supervision of the West African Currency Board, established by Britain in 1912 (Bank of Ghana, 2023; Dwamena & Yusoff, 2022). Only after Ghana gained independence from Britain on 6 March 1957 was Ghana's central bank, the Bank of Ghana, established with the directive to protect depositors' interests and ensure the Ghanaian financial system's safety, soundness, and stability (Bank of Ghana, 2018; Bank of Ghana, 2023; Dwamena & Yusoff, 2022).

Despite the Bank of Ghana's international orientation and receptiveness to international banking standards (since all five central governors that have been in office since 2000 have worked at either the World Bank, the African Development Bank or the International Monetary Fund), the pre-2001 Ghanaian banks[1] were more domestically orientated with little appetite to adopt the Basel II- and III regulatory frameworks (Jones, 2022). Only when the New Patriotic Party (NPP) came into power between 2001-2008 were sustained efforts made by politicians and senior bank officials in the Bank of Ghana to implement the Basel regulatory frameworks by creating a financial service hub which consisted of an offshore banking facility that served as the foundation of their development strategy (Jones, 2022).

However, from 2009 to 2016, the National Democratic Congress (NDC) political party was in office, and they championed a nationalist tradition that did not include prioritising the

[1] For the purpose of this study, the term *Ghanaian banks* will refer to locally- and foreign-owned banks operating in the Ghana.

financial service hub. Most senior bank officials who advocated for implementing the Basel regulatory frameworks left the Bank of Ghana, thereby depriving it of the drive to continue with the implementation process (Jones, 2022). Only after the NNP political party regained power at the end of 2016 did implementation of the Basel II regulatory framework resume – with the objective of positioning Ghana as an international financial services centre. As a result, international regulatory standards were incorporated into the banking sector's reform, which meant that the Basel II regulatory framework's capital-related and risk management elements were incorporated into the Bank of Ghana's Capital- and Risk Management Requirements Directives (Bank of Ghana, 2018; Bank of Ghana, 2021; Jones, 2022; Adjei, 2018).

Despite the effort to implement the Basel regulatory frameworks, Ghana's banks faced a period of turmoil and volatility between 2016-2018. This resulted in a decline in the profitability levels in Ghana's banking sector. A decline was recorded in their return on equity (21.4% in 2015 to 17.3% in 2016) and their assets (4.5% in 2015 to 3.8% in 2016), while non-performing loans rose to 19.7%. Due to these declines and the high percentage of non-performing loans, the Ghanaian banking sector was classified as a sector in crisis (Dwamena & Yusoff, 2022).

This banking crisis that ended in 2018 resulted in the Bank of Ghana embarking on a clean-up effort to stabilise the banking sector through implementing initiatives, such as recapitalisation, revocation of licences, consolidation, voluntary shutting down and resolutions of banks (Amenu-Tekaa, 2022; Dwamena & Yusoff, 2022; Torku & Laryea, 2021). This clean-up effort resulted in a decline in the registered banks operating in Ghana on August 2017 from 32 to only 23 by the end of 2018 (Torku & Laryea, 2021). Throughout the clean-up effort, the Bank of Ghana constantly reiterated the need for more stringent regulatory policies and regulations to ensure a robust banking sector (Bank of Ghana, 2018; Bank of Ghana, 2021; Bank of Ghana, 2019).

Although the cause of Ghana's banking sector crisis is still a debatable topic among researchers and banking analysts, a constant in these discussions is the inability of the Bank of Ghana to regulate the financial sector and to improve the corporate governance of banks (Dwamena & Yosoff, 2022; Akolgo, 2022; Blankson, Amewu & Anarfo, 2021;

Dogbe, 2020; Amponsah-Mensa, 2021; Torku & Laryea, 2021; Benson, 2019). Other causes for the banking sector crisis highlighted by the authors are: ineffective operational risk management practices, regulatory lapses, poor risk governance, insider trading, high non-performing loans and macro- and microeconomic instability (Dwamena & Yusoff, 2022; Amponsah-Mensa, 2021; Torku & Laryea, 2021, Duho, 2019).

1.3 Problem statement

Financial institutions and bank regulators have traditionally focused on the measurement and management of market- and credit risk exposures. However, after the 2007-2008 GFC, significant attention has been paid to improving operational risk management, following several high-profile losses in banks where poor operational risk management was highlighted as an area of concern (Barth, Caprio, & Levine, 2008). Research conducted by Namazian and Eslami, (2011) and Pitinanondha (2008) underpinned the relevance of operational risk management as a critical measure to control and mitigate operational risk exposures in banking operations. Amuakwa-Mensah and Boakye-Adjei (2015) and Hess (2011) supported the findings of Barth *et al.* (2008). They argued that the primary cause of the 2007-2008 GFC among financial institutions was the gross violation of operational risk management procedures and a lack of adequate attention to operational risk management processes and functions. Further studies conducted by Kashian and Drago (2017) and Tella, Suraya, Bonsu and Anani-Bossman (2020), also confirmed that ineffective operational risk management practices among banks were one of the principal causes of the emerging banking crisis across the globe.

Consequently, the importance of operational risk management programs and awareness creation in the banking sector cannot be over-emphasized as it plays a vital role in strengthening banks' competitiveness, risk resilience and financial stability (Arhenful, Yeboah & Tackie, 2019; Kashian & Drago, 2017).

The Basel Committee on Banking Supervision (BCBS) recognised the critical importance of managing operational risk within the banking sector and included principles and guidelines in the Basel II- and Basel III regulatory frameworks to address this important risk category (BIS, 2004; BIS,2011a). Blankson, Amewu and Anarfo (2021) stated that

adopting the operational risk management requirements prescribed by the Basel II- and Basel III regulatory frameworks will assist banks to mitigate and manage ongoing operational risk challenges more effectively. Dohu (2019) agreed with Blankson *et al.* (2021) and emphasised the importance of effective risk management practices − as the generic business of banking always involves risk and the management thereof. Adjei (2018) also supported the findings of Blankson *et al.* (2021) and Dohu (2019) and stated that adopting the operational risk management requirements of the Basel III regulatory framework is particularly important since operational risk is embedded in every fibre of a bank.

Although the Ghanaian banking sector has indicated significant growth since 2018, measured in terms of the total assets under management, the money supply to GDP (gross domestic product) ratio, the deposit to GDP ratio, and the bank credit to GDP ratio, the sector is still regarded as inefficient and inexperienced (Bank of Ghana, 2020; Dwamena & Yusoff, 2022; Torku & Laryea, 2021; Atuahene, 2016).

According to Amponsah-Mensa (2021), the Bank of Ghana should specifically focus on implementing the supervisory and regulatory requirements of Basel II- and III regulatory frameworks to ensure the safety, soundness, and stability of Ghanaian banks. To limit the effect of a possible future banking crisis and sustain financial performance, Ghanaian banks must keep abreast of the regulatory developments in the global banking industry as directed by the Basel regulatory frameworks with a specific focus on operational risk management (Amponsah-Mensa, 2021).

Arthenful *et al.* (2020) further stated that the ineffective management of operational risk has a negative impact on the financial performance and sustainability of commercial banks operating in Ghana. This was also confirmed by Gadzo, Kwabla and Gatsi (2019), who found that the operational risk management practices of Ghanaian banks are not effective and needs to be improved as effective operational risk management positively impacts the financial performance and competitiveness of Ghanaian banks (Owusu, 2015). Amenu-Tekaa (2022) agreed with the finding of Gadzo *et al.* (2019) and furthermore stated that complying with the requirements of the Basel regulatory frameworks will assist in building a resilient Ghanaian banking sector and position

Ghanaian banks to meet the various banking and capital investment needs of the country's economy.

The importance of operational risk management programs and awareness creation in the banking sector cannot be over-emphasized as it significantly strengthens banks' competitiveness, risk resilience and financial stability (Arhenful, Yeboah & Tackie, 2019; Kashian & Drago, 2017).

Unfortunately, to date, Ghanaian banks have found it challenging to implement the reforms of the Basel regulatory frameworks because of its complexity, higher compliance costs, a lack of supervisory guidance, political interference and human resource constraints (Andrae, 2014; Bjarnesjo & Lundberg, 2013; Fratianni & Pattison, 2015; Gagakuma & Kpawul, 2017; Nyantakyi & Sy, 2015; Ozili, 2019; Schmaltz, Pokutta, Heidom &; Ozili, 2019). Ghanaian banks have therefore not experienced all of the frameworks' benefits, especially regarding improved operational risk management practices and enhanced financial stability, risk resilience and sustainability (Jones, 2022; Gadzo, Kportorgbi & Gatsi, 2019).

The findings of Jones (2022) and Gadzo, Kportorgbi and Gatsi (2019) were supported by a survey conducted by the Ghana Association of Bankers in 2020 (GAB) that revealed that 60% of Ghanaian bank personnel claimed risk management was the most significant challenge for Ghanaian banks (Gakpo, 2020). Ghanaian banks have not successfully implemented the operational requirements of the Basel III regulatory framework and as a result have not been able to manage operational risks successfully (Bank of Ghana, 2019; Jones, 2022; Gadzo, Kportorgbi & Gatsi, 2019; Nana-Cobbinah, 2014).

Therefore, it is vital that the Bank of Ghana finds mechanisms and solutions to implement the operational risk management requirements of the Basel III regulatory framework in Ghanaian banks (Adjei, 2018; Duho, 2019). By adopting the Basel III operational risk management requirements, the Bank of Ghana will enhance the quality of operational risk management and supervision, thereby strengthening Ghanaian banks' financial stability and resilience (Amenu-Tekaa, 2022; Mawutor & Kwadwo, 2015).

Hence, the primary research question for this study was formulated as follows:

How can Ghanaian banks be assisted in increasing their level of operational risk management compliance with the Basel III regulatory framework?

1.4 Research objectives

From the research question formulated above, the following primary research objective was formulated:

PRO: To develop guidelines for Ghanaian banks to enhance their level of operational risk management compliance with the Basel III regulatory framework.

In order to address the primary research objective, the following 15 secondary research objectives were formulated:

SRO_1: To obtain a theoretical perspective on uncertainty, risk, risk management and enterprise risk management.

SRO_2: To establish the importance of risk management from a banking perspective.

SRO_3: To establish the importance of bank regulation by examining the role of the BIS and the BCBS.

SRO_4: To examine concepts essential to the successful operation of banking institutions.

SRO_5: To obtain a broad overview of the Basel I-, Basel II- and Basel III regulatory frameworks.

SRO_6: To investigate the purpose and improvements of each pillar of the three Basel regulatory frameworks.

SRO_7: To obtain a thorough understanding of how operational risk management is addressed by the regulatory frameworks and ought to be managed by banking institutions.

SRO_8: To identify and analyse each regulatory framework's strengths and weaknesses.

SRO_9: To obtain a comprehensive perspective and understanding of operational risk and its management in a banking context.

SRO_{10}: To examine the importance of risk culture and risk governance in banks.

SRO_{11}: To investigate the interdependence and interconnectedness of banks' risk culture- and risk governance practices to promote the effective operational risk management in banking institutions.

SRO_{12}: To obtain general information on the respondents and Ghanaian banks.

SRO_{13}: To investigate the operational risk management practices of Ghanaian banks.

SRO_{14}: To explore the risk governance practices of Ghanaian banks.

SRO_{15} To assess the implementation of a risk culture in Ghanaian banks.

1.5 Significance of the study

It is envisaged that by delivering a unique set of guidelines to Ghanaian banks on how to improve their operational risk management practices as well as their risk culture- and risk governance procedures concerning the management of operational risk, a valuable contribution to the body of knowledge on operational risk management can be made. These guidelines will enable Ghanaian banks to advance their level of compliance with the operational risk management requirements of the Basel III regulatory framework, which will also contribute towards improving the financial soundness of individual banking institutions and advancing the financial stability, resilience, and sustainability of the country's banking sector.

The study will also serve as a basis for future research aimed at improving the operational risk management practices of banks operating in other developing African countries with the ultimate objective of advancing the level of compliance with the operational risk management requirements prescribed by the Basel III regulatory framework.

Following is a brief summary of the research approach used to achieve the studies main objectives.

1.6 Research design and methodology

In the views of Saunders, Lewis and Thornhill (2012), a research design is critical for any study to achieve its objectives. A research design is a blueprint for answering the research question and achieving the primary and secondary research objectives (Creswell, 2014; Kothari & Garg, 2019). The research arose from the perceived need to understand, evaluate and improve the Ghanaian banks' operational risk management, risk culture and risk governance practices and ultimately increase their operational risk management compliance with the Basel III regulatory framework.

1.6.1 Research paradigm and approach

Firstly, this study was conducted from a positivistic research philosophy, as the researcher assumed that the nature of knowledge is objective. The study investigated elements in operational risk management practices of Ghanaian banks concerned with the external reality. The study had clear objectives and attempted to question the predominant social constructions of reality. The researcher was interested in creating new knowledge and envisioned making a meaningful contribution towards Ghanaian banks' management and governance of operational risk. Consequently, the positivistic research paradigm was deemed most appropriate because investigating and researching knowledge management practices and learning within organisations (more specifically, financial organisations) are profoundly embedded within a social context (Saunders *et al.*, 2012; Mutezo, 2015; Schindler, 2019).

Secondly, a deductive research approach was implemented since this research started by exploring operational risk management through a literature study (Chapters 2, 3 and 4) and continued by testing the theoretical propositions (Chapters 6 and 7) with an appropriate research instrument. Deductive reasoning occurred since the guidelines presented in Chapter 8 were derived logically from a set of premises (literature and empirical findings) (Bryman, 2016).

1.6.2 Methodology

Because of the dynamic nature of operational risk management within the financial services sector, ample information was available on operational risk and the management thereof, making a non-experimental descriptive research design appropriate for this study (Creswell, 2014; Saunders *et al.*, 2012).

Accordingly, secondary data were analysed by conducting a comprehensive traditional literature review in Chapters 2, 3 and 4 focusing on risk management in banks, the evolution of the Basel regulatory frameworks and operational risk, risk culture, and the governance of risk. Thereafter, the primary data were collected quantitively from Ghanaian bank personnel with expertise in operational risk management, risk governance and compliance, bank supervision, and the implementation of the Basel regulatory frameworks. These were statistically analysed (see Chapters 6 and 7).

The selection of a non-experimental descriptive design and the collection of primary data qualitatively align with the research philosophy and approach selected for the study (Creswell, 2014).

1.6.3 The population of interest

The population of a study can be defined as a group of elements that shares a common set of characteristics (Babin & Zikmund, 2016) and is an essential source of information for any research project (Cooper & Schindler, 2014; Saunders *et al*., 2014). The population for this study was Ghanaian bank personnel employed at any of the 23 registered banks operating within Ghana. These individuals specialised in: operational risk management, risk governance and compliance, bank supervision, and the implementation of the Basel regulatory frameworks.

1.6.4 Sampling method

A *sample* is defined as a group of elements comprising a portion of the population that is carefully selected to represent that population (Saunders *et al.*, 2012; Newby, 2010). A non-probability sampling technique was selected for this study. Purposive non-probability sampling ensures that samples are formed suitable for the research context

(Vijayamohan, 2022). Therefore, the researcher deliberately decides on the individual elements to be included based on various criteria, including specialist knowledge of the research problem, accessibility, capacity, and willingness to participate in the study (McDaniel, Lamb & Hair, 2008; Kothari & Garg, 2019). For this study, the researcher ensured that the potential respondents were identified based on their area of specialisation, knowledge of operational risk management, risk governance and compliance, bank supervision, and implementing the Basel regulatory frameworks. The researcher identified 126 Ghanaian bank personnel with the required specialised knowledge and expertise.

1.6.5 The sample size

The sample size refers to the number of respondents included in a study. When utilising a non-probability sampling method, the sample size depends on the research question and objectives (Saunders *et al*., 2020). The sample (Ghanaian bank personnel) was carefully selected based on their area of specialisation. Due to the inclusion of specific selection criteria, the sample was homogeneous and feasible (Fricker, 2008; Kaplan & Saccuzzo, 2008).

The researcher sent the questionnaire (see Section 1.6.6 below) to 126 Ghanaian bank personnel with the required specialised knowledge, and 57 completed questionnaires were returned − which equated to a response rate of 45.23%.

Due to the respondents' homogeneity and the sample size that was more than 30, the study was aligned, firstly, with the work of Fricker's (2008), Kaplan and Saccusso's (2008) and Zikmund, Babin, Carr and Griffin (2009). These authors stated that a small sample is acceptable if a population is homogeneous. Secondly, the study also aligned with the work of Stutely (2003), who pointed out that a sample size of 30, or more, will result in a sampling distribution for the mean that is very close to a normal distribution. Consequently, the sample of 57 Ghanaian bank personnel was deemed to be an acceptable sample size for this study.

1.6.6 Research instrument

A questionnaire was used as the primary data-collection instrument. Data collection via questionnaires is the most practical research method as it is cost-effective and can be administered within a short period without compromising the research's validity and reliability (Creswell, 2014). The questionnaire was designed by the researcher and consisted of closed-ended, open-ended and scale-response questions.

In order to ensure that the questionnaire was error-free and all questions formulated in such as manner that respondents would understand the questions, a pre-testing procedure was conducted in two phases. In the first phase, a statistician was consulted to ensure that questions were formulated to enable the necessary statistical analyses. In the second phase, research experts and experienced banking practitioners were consulted to improve and finalise the questionnaire.

1.6.7 Data collection

A fieldworker employed by the Ministry of Finance and a permanent resident of the capital of Ghana, Accra, was appointed to distribute the questionnaires via email to the 126 possible respondents identified by the researcher. Initially, only 48 were returned. The fieldworker followed up with persons who initially did not respond, and, in some cases, personal appointments were made to collect the completed questionnaires. Tustin, Ligthelm, Martins & Van Wyk (2010) indicated that this approach could positively affect the response rate in survey research − which was the case for this study as an additional nine questionnaires were returned. Therefore, a total of 57 completed questionnaires were received.

1.6.8 Data analysis

The Statistical Package for the Social Sciences (SPSS) version 25 was utilised to analyse the collected primary data. Both descriptive and inferential statistical analyses were conducted. The descriptive statistical analyses were conducted to gain an accurate overview of Ghanaian banks' operational risk management-, risk culture- and risk governance practices, which are reported on in Chapter 6. The inferential statistical analyses, presented in Chapter 7, were performed to obtain additional information by

means of hypotheses development and testing, which was conducted with three inferential statistical tests: the Mann-Whitney U test, the Fisher's exact test, and multiple regression analyses.

1.6.9 Ethical considerations

All ethical standards and principles were met throughout the study, as set out by the University of South Africa (Unisa) Ethical Policy. This study was conducted according to the four moral principles of ethics that Unisa recognises as the basis of any research, namely:

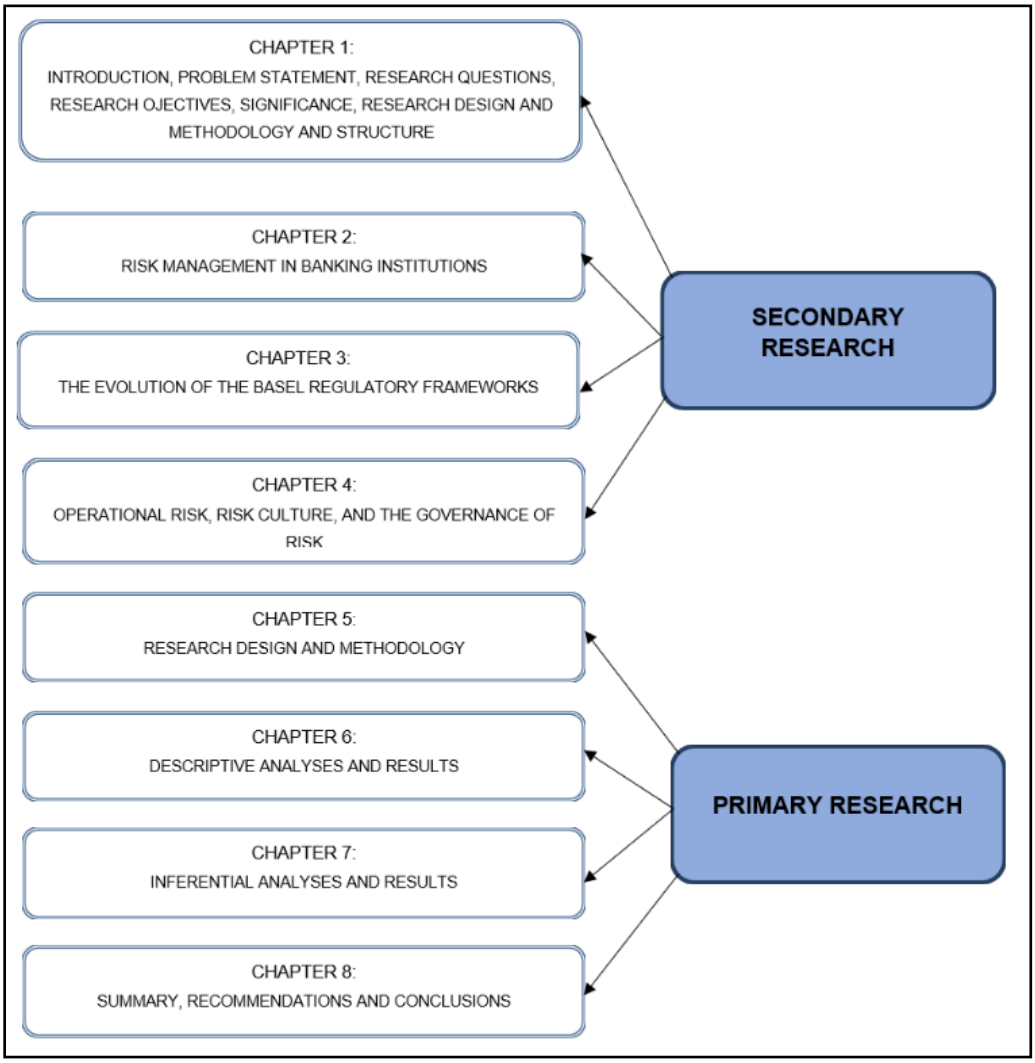
- Research should respect the autonomy, rights and dignity of research participants.
- Research should make a positive contribution toward the welfare of people.
- Research should not cause harm to the research participant(s) in particular or to people in general.
- The benefits and risks of research should be fairly distributed among people (Unisa, 2014:9).

The Unisa Ethical Policy requires that certain general ethical principles are met before, during and after the research. See Appendix C for a copy of the ethical clearance certificate obtained prior to commencing with the study.

1.7 Structure of the study

In this section, the study layout is presented, followed by a brief description of the content of each chapter. Figure 1.1 outlines the logical flow of the chapters.

Figure 1.1: Structure of the study



Source: Author (2022).

1.7.1 Chapter 1: Introduction

Chapter 1 provides a broad outline of the entire study. An introductory background is provided, followed by a discussion of the problem statement from which the research questions and objectives were derived. Next, the significance of the study is described, and the research methodology is discussed. The chapter concludes with an overview of the thesis.

1.7.2 Chapter 2: Risk management in banking institutions

Chapter 2 contains a literature study on risk management from a banking perspective and provides context to the study by clarifying the role of the BIS and the BCBS. The chapter concludes with a theoretical explanation of concepts vital to financial institutions' successful functioning and financial well-being.

1.7.3 Chapter 3: The evolution of the Basel regulatory frameworks

In Chapter 3, a review of the developments and evolution of the Basel regulatory frameworks is presented. This theoretical context is necessary to highlight the key role of regulatory- and supervisory authorities in strengthening the reliability and stability of the international banking system and addressing the different categories of risk which banks face. In addition, the chapter discusses the shortcomings and strengths of each regulatory framework, as well as the manner in which they address operational risk management.

1.7.4 Chapter 4: Operational risk, risk culture and the governance of risk

In Chapter 4, an in-depth investigation is undertaken of concepts applicable to operational risk and its management from a banking perspective. The operational risk lifecycle of banks warrants a study in its own right and has therefore been excluded from this study. The chapter examines the importance of establishing sound practices on risk culture and risk governance within banking institutions. It also comments on why these practices are necessary to maintain effective operational risk management procedures.

1.7.5 Chapter 5: Research design and methodology

Chapter 5 addresses the research methodology that was used for the study. The chapter also provides the rationale for selecting the quantitative approach and elaborates on the research design, the research method and the measures taken to ensure validity, reliability and practicality. Information is provided on the research instrument employed for data gathering, the population, the sample and the sampling technique utilised. Finally, the techniques applied to analyse the data are discussed, and the chapter concludes with remarks on the measures taken to adhere to all relevant ethical considerations.

1.7.6 Chapter 6: Descriptive analyses and results

Chapter 6 reports on the descriptive statistical analyses conducted on the primary data.

1.7.7 Chapter 7: Inferential analyses and results

This chapter discusses the inferential statistical analyses of the data and the interpretation of the results obtained. The inferential statistical tests utilised included the Mann-Whitney U test, Fischer's exact test and multiple regression analysis.

1.7.8 Chapter 8: Summary, recommendations, and conclusions

Chapter 8 synthesises the literature findings of Chapters 2, 3 and 4 with the empirical findings of Chapters 6 and 7. Next, the guidelines for Ghanaian banks regarding their operational risk management-, risk culture- and risk governance practices are presented. The purpose of the guidelines is to enhance Ghanaian banks' level of operational risk management compliance with the Basel III regulatory framework. The limitations of the study are presented, and recommendations for future research are highlighted.

Chapter 2 - Risk management in banking institutions

2.1 Introduction

The banking sector is undoubtedly one of the most regulated sectors globally, and the rules and regulations imposed on bank capital are some of the most prominent of these regulations. This prominence results from the fundamental role that banks play in financial intermediation; the importance of bank capital in achieving financial soundness and financial stability in a country's economy; and the efforts of the international community to promote and adopt general bank capital standards (De-Graft Quansah, 2014; Santos, 2001).

Notwithstanding the multiple reasons for regulating the banking sector, the primary reasons for bank regulation originated from microeconomic concerns over the ability of bank creditors (depositors) to monitor the risks originating on the lending side and from micro and macroeconomic concerns over the safety and stability of the banking system in the case of a bank crisis (Blinder, 2010). The importance of promoting and maintaining financial stability in any country's economy cannot be over-emphasised, and therefore it is important to realise that the era of self-regulation of banks is something of the distant past (Blinder, 2010; Santos, 2001).

In his 2014 publication, De-Graft Quansah emphasised that well-functioning banking systems have a direct impact on the economic growth and development of a country's economy. Banking systems, however, do not always function in a beneficial manner and, thus, at times, fall short of achieving their objectives. As a result, the importance of imposing bank regulation is non-negotiable (De-Graft Quansah, 2014; Santos, 2001).

Regulatory authorities of banks enforce minimum capital requirements for two important reasons. In the first instance, the capital adequacy requirements provide the board and senior management with an incentive to curb excessive risk-taking, and secondly, the capital adequacy requirements act as a buffer to protect bank deposits against losses incurred by banks (Brownbridge, 2014).

However, the global standards that have shaped bank regulation over the past two decades required improvement as they could not prevent the events leading to the 2007-2008 GFC. This crisis exposed the weaknesses in the global banking system (Moosa, 2010). These weaknesses have highlighted the need to reshape and improve the regulation of the banking sector in an attempt to prevent a repeat of such a crisis (BIS, 2012; Blinder, 2010).

The purpose of this chapter is to address the following secondary research objectives:

- To obtain a theoretical perspective on uncertainty, risk, risk management and enterprise risk management ($SR0_1$).
- To establish the importance of risk management from a banking perspective ($SR0_2$).
- To establish the importance of bank regulation by examining the role of the BIS and the BCBS ($SR0_3$).
- To examine concepts essential to the successful operation of banking institutions ($SR0_4$).

In the next section, uncertainty, risk, and exposure to risk will be discussed.

2.2 Uncertainty, risk, and exposure to risk

The context in which risk can be viewed is so diverse that no single definition can cover all its possible meanings. When it comes to understanding the true meaning of risk, there is a wide variety of definitions among authors (Bezzina, Grima & Mamo, 2014; Chapman, 2011; Valsamakis, Vivian & Du Toit, 2010).

In his seminal work, Pfeffer (1956) defined *risk* as a combination of hazards measured by probability. Denenberg, Eilers, Malone and Zelten (1974) described risk as the uncertainty of loss, where risk is understood as the uncertainty of a financial loss. Drucker (1979) argued that the capacity and readiness to take risks comprise the essence of economic activity and that risk can result in either positive or negative outcomes for an organisation. Economic activity, by definition, commits present resources to an uncertain future. One thing that is certain about the future is its uncertainty and the risks embedded within this

uncertain future. For this reason, incurring risk is the essence of economic activity (Drucker, 1979; Hampton, 2009).

Bessis (2015) agreed with the perspective provided by Denenberg *et al.* (1974) and expanded on this view by stating that because risk involves a certain degree of uncertainty, it might negatively affect the earnings of a bank or increase the volatility of investment returns. This volatility can produce either positive or negative results for organisations, which is particularly important for banking institutions (Bessis, 2015).

Valsamakis *et al.* (2010) defined risk as the variation of the actual outcome from the expected outcome and concluded that the greater the possible deviation between the expected and actual outcome, the greater the risk.

From this perspective on the meaning of risk, it is evident that a definite relationship exists between risk and uncertainty. The degree of uncertainty in a specific decision or economic activity determines the extent of the risk (Chapman, 2011; Rejda, 2011, Valsamakis *et al.*, 2010).

The uncertainty of an outcome cannot be eliminated, but the exposure to uncertainty can be managed by effective risk management techniques. As a result, the Basel regulatory frameworks[2] represent the BCBS's[3] initiative towards more effective and more efficient management of risks as encountered by the global banking sector (Bessis, 2015).

Before the focus shifts to the BIS and the BCBS, it is necessary to understand and discuss risk management as a concept.

2.3 Risk management

Bernstein (1996) viewed risk management as a process that guides an organisation over a vast range of decision-making initiatives. The objective of risk management is to maximise the areas where the organisation has some control over the outcome and minimise the areas where the organisation has no such control.

[2] The Basel regulatory frameworks will be discussed in Chapter 3.
[3] Refer to Section 2.6 for information on the Basel Committee on Banking Supervision.

The Institute of Risk Management (IRM) (2002) argued that risk management is a fundamental part of any organisation's strategic management plan; consequently, it is indispensable if the organisation seeks sustainability for its business operations while pursuing future growth.

Purdy (2010) believed that managing risk involves a comprehensive, systematic process of optimisation, which improves the probability of achieving organisational objectives. Chapman (2011) agreed with this view and added that risk management involves controlling risks as far as possible, thereby enabling the organisation to maximise its respective opportunities.

According to Chapman (2011), the management of both upside risks (opportunities) and downside risks (threats) is necessary to preserve and increase shareholder value. Power, Scheytt, Soin and Sahlin (2009) stated that a successful organisation manages risk in accordance with established frameworks. It is imperative to understand that the objective of risk management is not to prohibit or prevent risk-taking activities but instead to ensure risks are consistently recognised, understood, measured and mitigated (Narayana & Mahadeva, 2016).

Sookye and Mohamudally-Boolaky (2019) understood that risk management should not be treated as a compliance burden but rather as a value-added function. Shifting towards a more transparent environment, less involvement in too volatile economics, and investing in effective technology will improve the management of risks, particularly within the banking sector (Sookye & Mohamudally-Boolaky, 2019).

In light of the various perspective discussed above, attention now shifts to the objective of and importance of effective risk management within organisations.

Risk management is the application of a proactive strategy to plan, lead, organise and control different types of risks encountered by an organisation (Narayana & Mahadeva, 2016). With risk management, organisations methodically address the risks attached to their activities with the objective to attain sustained benefit within each activity and across the portfolio of all activities (IRM, 2002).

As far as a banking institution is concerned, the objective is to exercise risk management in such a manner that sustainable, competitive business operations are achieved (Kemp & Patel, 2011). Stulz (2014) argued that the objective of risk management for banks is not to eliminate risk entirely but rather to determine the optimal level of risk. A well-governed bank will have procedures to identify the optimal amount of risk and ensure that its risk will not exceed its risk appetite[4]. Effective risk management increases the probability of success, reduces both the likelihood of failure and uncertainty, and supports the organisation in achieving its objectives (Valsamakis *et al.*, 2010; Kanchu & Kumar, 2013). Hence, taking and effectively managing risk is critical for business survival as it contributes towards achieving financial stability and promoting future growth, which is essential in order to create shareholder value (Chapman, 2011; Raghavan, 2003).

From the perspectives provided on risk and the importance of risk management, the next section will discuss enterprise risk management (ERM). ERM supports improved structure, enhanced reporting, and analysis of risk: all of which are particularly important to financial institutions (Deloitte, 2018; Power, 2005b).

2.4 Enterprise risk management

Financial institutions, such as banks, are exposed to a volatile environment characterised by a broad spectrum of risks, where accurate decision-making is critical. Organisations no longer utilise the traditional "silo-based" approach to managing risks as it is no longer relevant and effective in current economic times (Chapman, 2011; Zeghal & El Aoun, 2016).

The modern business environment, characterised by ever-evolving challenges and the continuous emergence of new risks, has made it imperative for banks to adopt and implement a holistic approach to risk management that is comprehensive, inclusive and proactive (Maurer, 2009; Razali & Tahir, 2011).

[4] *Risk appetite* is defined as the written articulation of the aggregate level and types of risk that a firm will accept or avoid, in order to achieve its business objectives (BIS, 2015a; Gontarek, 2016).

Risk management experts, researchers and academics have identified this improved system as ERM (Chapman, 2011; Gatzert & Martin, 2015; Razali & Tahir, 2011).

The Committee of Sponsoring Organizations of the Treadway Commission (COSO) defines ERM as:

a process, effected by an entity's board of directors, management, and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives (COSO, 2004:2).

ERM aggregates all the risks across the entire bank and involves understanding the interdependencies between the different risks among the bank's various business lines, as well as the way the realisation of risk in one business line may increase the likely impact of risks within another business line (Chapman, 2011, Gatzert & Martin, 2015; Hoyt & Liebenberg, 2011; Pagach & Warr, 2010).

Owing to ERM's broad, complete nature, no single employee or executive of a bank will have all the required expertise to manage this comprehensive risk management system. ERM necessitates a team approach, where the skills, knowledge and experience of personnel working within different departments in the bank will be required (Grebe, 2015; Chapman, 2011; Meulbroek, 2002).

The successful implementation of ERM calls for the appointment of a chief risk officer (CRO) who serves as a supervisor and coordinator of risk management; a position that does not exist in traditional risk management[5]. The purpose of this important appointment is to ensure an efficient and effective communication function with a direct reporting line to the board of directors and shareholders regarding a bank's current risk position and risk profile. As a result, the information asymmetries between organisational representatives and shareholders will be reduced, leading to improved communication,

[5] *Traditional risk management* is defined as a system focusing attention on each risk separately (Dionne, 2013). A traditional risk management process entails identifying, measuring, monitoring and reporting risks individually or in silo's but with little formality, structure, or centralisation (Lundqvist, 2015).

transparency and investor confidence (Liebenberg & Hoyt, 2003; Gatzert & Martin, 2015; Shahid & Abbas, 2019; Razali & Tahir, 2011).

Risk management experts and academics agree that ERM contributes to increasing an organisation's value by reducing the volatility of their earnings and stabilising their share prices. In addition, ERM lessens the cost of external capital, increases capital efficiency, and creates synergies among respective risk management activities (Aquino, Jalagat, Mubeen, Mahmood & Zehra, 2022; Chen, Chuang, Huang & Shih, 2020). Organisations that successfully practise ERM are also more likely to grasp the variety of risks inherent in different business activities and can therefore provide the top management team of a bank with a more objective and accurate basis for allocating capital (Hoyt & Liebenberg, 2015; Walker, 2015). A study by Gatzert and Martin (2015) found a positive relationship between the implementation of an ERM system and the financial performance and shareholder value of financial institutions. These findings are supported by a study conducted by Zeghal and El Aoun (2016), where the benefits of ERM were identified as a reduction in share price volatility, a decrease in external capital costs, and an increase in capital efficiency within organisations. Dickenson (2001) argued that ERM is such an essential component of the financial well-being of an organisation that it should be one of the core investment criteria on which an investor makes sound investment decisions.

The potential benefits for banks of integrating ERM and operational risk management include the following:

- Shared solutions: Risks that share the same root cause will be revealed. These revelations will create opportunities for agency-wide solutions rather than each team trying to manage every risk independently (Deloitte, 2018).
- Escalation: A channel to elevate operational risks to ensure they are acted upon appropriately will be created. The broader involvement by top management may generate new and improved operational risk management initiatives (Deloitte, 2018).
- Visibility: By sharing risk with senior management, risk awareness will expand, and responsibility for risk will be shared (Deloitte, 2018).

- Resource allocation: A comprehensive view of how to effectively resource risk management activities will channel resources to key risk management activities (Deloitte, 2018).

ERM, as a comprehensive, holistic and dynamic risk management approach, will add value and increase organisations' bottom line (Pagach & Warr, 2010; Walker, 2015). Financial institutions, such as banks, will reap the benefits of adopting this all-inclusive risk management approach as it will improve how operational risks are managed (Power, 2005b; Deloitte, 2018). Therefore, ERM should be considered an essential component for banks to gain and maintain a competitive advantage[6] and maximise shareholder value (Maurer, 2009; Pagach & Warr, 2010; Walker, 2015).

Following the discussion above, the next section will focus on the BIS and its role in contributing to financial stability and creating resilient banking institutions.

2.5 The Bank for International Settlements (BIS)

The BIS, with its headquarters in Basel, Switzerland, was established in 1930 to assist with managing reparation loans after World War I. It soon transitioned into a body that addressed monetary and financial stability by conducting statistical analyses, economic research, and organising regular meetings between central bank governors and other global financial experts (BIS, 1988; De Cos, 2020; Schoenbaum, 2012; Wernz, 2014).

Today, the BIS is an international organisation owned by 62 central banks and monetary authorities from around the world. The BIS serves central banks and other financial authorities across the globe in gaining a better collective understanding of the world economy. It also fosters international cooperation among central banks and financial authorities and supports them in pursuing global monetary and financial stability (De Cos, 2020).

The BIS fulfils this mandate by acting as:

[6] A *competitive advantage* occurs when an organisation acquires or develops an attribute (or combination of attributes) that allows it to outperform its competitors (Nzioka & Kariuki, 2021).

- a forum to promote discussion and policy analysis among central banks and the international financial community,
- a centre for conducting economic and monetary research,
- a prime counterparty for central banks in their financial transactions,
- an agent or trustee connected with international financial operations (BIS, 2004; BIS, 2011a; De Cos, 2020; Wernz, 2014).

Since its establishment, the BIS has formed several standing committees to strike a balance between responsiveness to short-term, conjunctural issues and proactivity in exploring themes of strategic importance for central banks and prudential authorities in the pursuit of financial stability. The most influential of these committees is the BCBS which will be discussed in the next section (BIS, 2011a; BIS, 2012; BIS, 2020; Mostert, 2013).

2.6 The Basel Committee on Banking Supervision (BCBS)

The BCBS was formed in 1973 in response to the financial market chaos caused by the breakdown of the Bretton Woods system of managed exchange rates. This period was characterised by floating exchange rates, high inflation and the rapid growth of international financial markets (Goodhart, 2011). After the collapse of the Bretton Woods system, many banks incurred significant foreign currency losses. As a result, the financial stability of the global economy came under severe pressure and required urgent attention (Goodhart, 2011; Penikas, 2015).

On 26 June 1974, West Germany's Federal Banking Supervisory Office withdrew Bankhaus Herstatt's banking licence after it became clear that the bank's foreign exchange exposures amounted to nearly three times its capital (Goodhart, 2011). Banks outside German borders suffered substantial financial losses on their unsettled trades with Herstatt, which added an international perspective to the financial turmoil. In the United States, the collapse of Franklin National Bank further highlighted the critical need for effective banking supervision for international banking activities (BIS, 2014a; Goodhart, 2011; Penikas, 2015).

In response to these disruptions in the international financial markets, the central bank governors of the G10[7] countries established a committee on banking regulations and supervisory practices at the end of 1974. This committee was named the Basel Committee on Banking Supervision and was designed as a forum for regular cooperation between member countries on matters of banking supervision (BIS, 2014a; Goodhart, 2011, De Cos, 2020).

The objectives of the BCBS are to enhance financial stability, improve supervisory capability and improve the quality of banking supervision internationally (Magnus & Korpas, 2017). The BCBS pursues these objectives by setting minimum standards for the regulation and supervision of banks. Standards are set by sharing supervisory issues, approaches and techniques to promote a shared understanding and improve cross-border cooperation. In addition, the BCBS also exchanges information on developments in the banking sector and financial markets to help identify current and emerging risks for the global financial system (De Cos, 2020; BIS, 2014a).

The BCBS started in 1974 as a G10 body but has since expanded its membership twice (in 2009 and 2014). Currently, the membership of the BCBS consists of Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. Member countries are represented on the BCBS by their central banks or the authority with formal responsibility for the prudential supervision of banking activities when this is not the central bank. The member nations are invited to quarterly meetings to discuss regulatory changes to the international banking system (BIS, 2014a; De Cos, 2020; Goodhart, 2011; Mostert, 2013).

According to its charter, the BCBS has no legal authority over member countries (BCBS, 2018c). The committee has no formal multinational supervisory authority, and its conclusions are not, and were never, intended to have any legal force. Instead, the

[7] The Group of Ten (G10) was established in 1962 when Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom and the United States agreed to provide economic, financial and monetary support to the International Monetary Fund (IMF). Switzerland joined this group in 1964, but the group continued to be referred to as the G10 (Pata, 2021).

objective is to formulate supervisory guidelines and to encourage synchronisation towards common standards for member countries. This objective is achieved by exchanging information on developments in the banking sector, addressing regulatory and supervisory gaps concerning financial stability, sharing supervisory problems and techniques, and monitoring the progress of implementing standards put forward by the BCBS (BCBS, 2018c; Goodhart, 2011; Magnus & Korpas, 2017).

The BCBS encourages complete, timely and consistent implementation of its standards, but it is left to the discretion of each member country to implement and interpret these recommendations (Bjarnesjo & Lundberg, 2013; De Cos, 2020; BIS, 2014a; Goodhart, 2011).

The BCBS has been responsible for publishing numerous banking regulations and supervisory guidelines. Among these publications, the most influential are the Basel I-, Basel II- and Basel III regulatory frameworks (Goodhart, 2011; Penikas, 2015). These will be elaborated upon in Chapter 3.

In the next section, concepts relating to the operation of banking institutions will be discussed.

2.7 The operation of banking institutions

A discussion on important concepts regarding the successful operation of banking institutions will follow. This section will elaborate on the importance of capital regulation, the need to establish effective risk management procedures, and why it is essential for banks to have sufficient capital and liquidity levels. The section will therefore provide the necessary background to understand the relevance and value of the Basel regulatory frameworks for banking institutions (from a capital planning and risk management perspective).

This section is structured as follows:

- Defining capital in banking (Section 2.7.1).
- Explaining the purpose of capital regulation for banks (Section 2.7.2).
- Distinguishing between economic- and regulatory capital (Section 2.7.3).

- Explaining the difference between borrowed money and unborrowed money (Section 2.7.4).
- Discussing solvency in banking (Section 2.7.5).
- Discussing liquidity in banking (Section 2.7.6).
- Amplifying the necessity of asset-liability management for banks (Section 2.7.7).
- Providing clarity on stress testing in banking (Section 2.7.8).
- Explaining the functioning of securitisation in banking (Section 2.7.9).

2.7.1 Defining capital in banking

Capital can be defined as the long-term funds held by a business organisation, obtained by issuing ordinary or preference shares or both, retaining a percentage of the business organisation's earnings from the date of incorporation, and by long-term borrowing (Gitman, Beaumont Smith, Hall, Makina, Malan, Marx, Mestry, Ngwenya & Strydom, 2014). Capital includes cash and other financial assets a business organisation holds; it is the sum of all financial resources used to leverage growth and support and build financial stability (Piketty, 2015).

From a banking perspective, capital is similarly defined as the funds a bank has received from its owners or shareholders, along with any retained funds the bank has earned, which is then added up and reported in the equity line-item on the statement of financial position. Therefore, capital represents the difference between the market value of a bank's assets and deposit liabilities (Bjarnesjo & Lundberg, 2013; BIS, 2002a; Elliot, 2010; Gitman *et al.*, 2014; Kaufman, 1992).

According to Faulkender and Petersen (2006), bank capital is generally referred to as the net worth of the bank, which is the difference between a bank's assets and liabilities. Therefore, capital in banking acts as a reserve against unexpected losses and protects the bank's creditors in case the bank becomes insolvent and is liquidated (Faulkender & Petersen, 2006; BIS, 2019a).

2.7.2 The purpose of capital regulation

The financial services sector, specifically the banking sector, is one of the most regulated sectors in the world since it plays a pivotal role in the effective operation of the global economy. The regulation of bank capital is essential because it plays a key role in the risk-taking behaviour, competitiveness, and financial stability of individual banks (Borio & Zhu, 2012).

In 1958, Modigliani and Miller's seminal work[8] illustrated that in a perfect world with full information and complete markets, the value of business organisations is independent of its capital structure (Tinman, 2002; Pfleiderer, 2010). Ever since researchers have studied the implications of deviations from that perfect world to determine a business organisation's optimal capital structure. The costs of financial distress, taxes, imperfections in the product markets, transaction costs, and asymmetry of information are just some examples of the disruptions researchers have considered to explain a business organisation's capital structure (Borio & Zhu, 2012; Santos, 2001). Researchers have also considered two additional factors: a bank's access to its safety net, in particular, deposit insurance, and the fact that small, generally uninformed investors usually hold the majority of a bank's debt (Santos, 2001). Berger, Herring and Szegö (1995) rightfully pointed out that deposit insurance, when not reasonably priced, gives banks an incentive to increase risk, which banks can accomplish by increasing the risk to their assets. This risk-shifting incentive, combined with the potential externalities resulting from bank failures, has been the leading reason for regulating bank capital (Berger *et al.*, 1995).

In research conducted by Kahane (1977), Kareken and Wallace (1978) and Sharpe (1978), the effectiveness of capital standards in controlling banks' solvency in complete markets was studied. These researchers created a role for capital regulation by introducing deposit insurance. Depositors were fully insured and therefore had no incentive to adjust the required returns for the risk undertaken by banks. Since the

[8] The Modigliani-Miller Theorem, entitled "*The cost of capital, corporation finance and the theory of investments"*, is a cornerstone of modern corporate finance. The theorem provides conditions under which a firm's financial decisions do not affect its value. The market value of a firm is only dependent on the income stream generated by its assets. It follows, in particular that the firm's value should not be affected by the share of debt in its financial structure or by what will be done with the returns (paid out as dividends or reinvested) (Modigliani & Miller, 1958).

insurance providers charged banks a flat insurance premium, it incentivised them to increase risk. The problem with this justification for capital regulation was that when markets were complete and there was no information asymmetry, the need for deposit insurance was unclear. If it was on offer, it could be appropriately priced, effectively eliminating risk-shifting incentive (Santos, 2001).

This problem motivated researchers to investigate capital regulation in incomplete market settings. Researchers adopted the portfolio approach described by Pyle (1971) and Hart and Jaffee (1974), which modelled the bank as a portfolio of securities. Banks selected the composition of their portfolios to maximise the expected profit for a particular level of risk, taking the yields of all securities as given. Koehn and Santomero (1980) and Kim and Santomero (1988) adopted this approach. They assumed, as a proxy for the incompleteness of markets, that bankers were risk averse and consequently would maximise a utility function of the bank's financial net wealth.

The introduction of a flat capital requirement restricted the risk-return frontier of a bank, forcing it to reduce leverage and reconfigure the composition of its portfolio of risky assets. As a result, the bank's probability of failure may have increased since the banker may have chosen a riskier portfolio to compensate for the loss in utility. Bank regulators eliminated this adverse effect by requiring banks to incorporate and meet a risk-based capital requirement[9] or to operate within a minimum capital level (Blum, 1999; Santos, 2001).

The minimum level of bank capital for a bank now depends on the size of the bank's loan book and is related to the risk profile of the bank's assets (Kashyap, Rajan & Stein, 2008).

Therefore, the objective of capital regulation imposed on banks is threefold: First, it ensures that bank failures are minimised or even avoided. Secondly, it regulates the risk-taking capabilities of banks by not allowing them to take on precarious business decisions. Finally, it forces troubled banks to pursue re-authorisation from the capital market to continue operating (Zhu, 2007; Heid, Porath & Stolz, 2003; Kashyap *et al.*, 2008). Accordingly, if a bank suffered an adverse shock to its capital reserve and could

[9] A risk-based capital requirement receives further attention in Chapter 3.

not convince the equity market to contribute new financing, a binding capital requirement would compel the bank to shrink. As a result, it could be argued that the capital requirements prescribed by the bank regulator would impose a type of market discipline on banks (Kashyap *et al.*, 2008).

Bessis (2015) agreed with the findings of Kashyap *et al.* (2008) by stating that capital adequacy principles form the foundation of regulations aimed at making banks more resilient. Capital requirements can also be used to allow supervisory intervention before the onset of bankruptcy, which is the final argument to improve the financial stability of the banking sector (Hellwig, 2008; Gersbach, 2011).

Within the banking sector, capital is further categorised as economic- and regulatory capital (BIS, 2019b). These will receive attention below.

2.7.3 Economic capital versus regulatory capital

Economic capital and regulatory capital are two forms of capital that are frequently referred to in the Basel regulatory frameworks. It is necessary to make a clear distinction between these two forms of capital, and they are further investigated in Sections 2.7.3.1 and 2.7.3.2 below.

2.7.3.1 Economic capital

Kaufman (1992) explained economic capital (EC) as the amount of capital a bank requires to remain solvent, considering the riskiness of its operations. EC is often described as the necessary level of capital a bank requires to absorb unexpected losses over a specific time horizon at a given confidence interval by utilising the value-at-risk (VaR) approach[10]. EC can therefore be defined as the amount of capital that a financial institution requires to ensure that its statement of financial position remains in a healthy, solvent state (Breuer, Jandačka, Rheinberger & Summer, 2010).

[10] VaR refers to the lower bound of a confidence interval for a (conditional) mean, that is, a "worst-case scenario on a typical day". If a bank were to manage its risk by maintaining VAR to be no larger than its equity capital, it would ensure that it remains solvent (Adrian & Shin, 2014; Bessis, 2015; McAleer, Jiménez-Martín & Pérez-Amaral, 2013).

However, Calem and Rob (1999) provided a different perspective on EC by explaining it as the level of capital decided by the bank's shareholders at the beginning of each financial year to maximise the bank's value according to its unique risk profile. Repullo (2004) agreed with the view of Calem and Rob (1999) and added that the chosen level of EC represents a trade-off between maximising the value of the bank and minimising its exposure to risks.

Ho (2012) furthermore pointed out that EC can be regarded as a risk management instrument to monitor and address internal risk management practices. It enables banks to consistently assess risk and attribute the correct amount of capital to provide for the economic effects of risk-taking activities (Tasche, 2004; Dhaene, Goovaerts & Kaas, 2003).

EC can therefore be regarded as the capital level that a bank's shareholders would select to maximise the value of the bank according to its risk profile in the absence of capital regulation (Dhaene *et al.*, 2003).

2.7.3.2 Regulatory capital

According to the chairman of the BCBS, the primary objective of capital regulation is to set more risk-sensitive minimum capital requirements for banks to align regulatory capital (RC) more closely with EC (Calem & Rob, 1999; Repullo, 2004).

The purpose of capital regulation is to ensure that a bank has sufficient capital, in relation to its respective risks, to enable the absorption of the highest possible amount of loss and still be able to realise assets and raise new capital (Tracy, McGrane & Baer, 2015). Sookye and Mohamudally-Boolaky (2018) pointed out that the higher the capital adequacy ratio of a bank, the greater the level of unexpected losses a bank can absorb.

The Basel regulatory frameworks specifically address the amount of RC a bank should hold as a reserve. This capital reserve is expressed as a capital adequacy ratio of equity, which must be held as a percentage of risk-weighted assets (RWA)[11]. Therefore, RC

[11] RWA refers to an asset classification system used to determine the minimum capital banks should keep as a reserve to reduce the risk of insolvency. When calculating the RWA of a bank, the assets are categorised into different classes based on the level of risk. Riskier assets carry a higher risk of default and are therefore assigned a higher risk weight (Ferri & Pesic, 2017).

enables banks to enter into large exposures without the need to raise additional capital. It provides the required buffer so that banks do not suffer solvency problems or damage their reputations (BIS, 2002b; BIS, 2014b; Hitchins, Hogg & Mallet, 2001; Tracy *et al*., 2015).

2.7.4 Borrowed money versus unborrowed money in banking

From a banking perspective, capital can also be subdivided into borrowed money and unborrowed money. Unborrowed money is acquired without any binding agreement on making payments in the future. In contrast to unborrowed money, borrowed money is represented by the deposits from the bank's customers; the bank is obliged to make payments to its customers at any given time at the customers' request (Admati & Hellwig, 2013; Bjarnesjo & Lundberg, 2013).

Elliot (2010) pointed out that when a bank makes investment decisions by issuing loans to its customers, the bank has the option to access unborrowed or borrowed money or both. The RC requirements, specified by the Basel regulatory frameworks, provide guidelines to banks on the percentage of capital that should be funded from unborrowed money to absorb unexpected losses resulting from loan defaults (Elliot, 2010).

Bjarnesjo and Lundberg (2013) indicated that these capital requirements are prescribed to stabilise the banking system and enable the comparison of banks in terms of their resilience and risk profiles. Therefore, the capital requirements imposed on unborrowed money enable the bank to continue its day-to-day operations and remain financially stable (BIS, 2011a; Elliot, 2010; Jayadev, 2013).

2.7.5 Solvency in banking

Financial institutions, particularly banks, play a pivotal role in the financial stability and financial well-being of a country's economy. The 2007-2008 GFC caused markets to lose confidence in the solvency of many banking institutions, and for this reason, the solvency of banks should be closely monitored (BIS, 2011a; Bordo, 2008; Dicko, 2016).

Marx, De Swardt, Pretorius and Rosslyn-Smith (2017) defined *solvency* as the extent to which a bank's assets exceed its liabilities. Kyule (2015) described it as the ability of a

banking institution to meet its long-term financial obligations. Investors find the solvency position of a bank of interest because it directly affects their investment decisions' riskiness and long-term value (Kyule, 2015). Hall and Reis (2015) provided an additional perspective on the solvency position of banking institutions by defining solvency as the ability of a bank to conform to its dividend policy as laid out in its statutes. In his research, Dicko (2016) stated that solvency can be regarded as the most important factor in measuring financial institutions' financial performance and resilience since it measures a bank's ability to successfully manage its operations in the foreseeable future (Kyule, 2015).

2.7.6 Liquidity in banking

The BCBS (1997) defined *liquidity* as a bank's ability to accommodate decreases in liabilities or fund increases in assets. When a bank has insufficient liquidity, it cannot obtain adequate funds by increasing liabilities or converting assets promptly at a reasonable cost, which negatively affects its profitability levels (BIS, 1997). Gitman *et al.* (2014) defined liquidity as an organisation's ability to meet its short-term obligations as they become due.

Bjarnesjo and Lundberg (2013) defined bank liquidity as the ability of a bank to fund its contractual obligations on a day-to-day basis, which specifically include: lending and investment obligations, funding liabilities on or before their due dates, and successfully delivering on all deposit withdrawals.

A bank that is considered very liquid will hold a high percentage of liquid assets with short maturities because it will be able to convert its assets into cash within a short period to cover potential losses and obligations (Wagner,2007; Bjarnesjo & Lundberg, 2013). In contrast, a bank that holds fewer liquid assets and is primarily funded by sources with longer maturities will not be able to cover potential losses in a short period and therefore carries a considerably higher risk of insolvency (Chen, Shen, Kao & Yeh, 2018; Bjarnesjo & Lundberg, 2013).

Research conducted by Acharya, Shin and Yorulmazer (2011) found that banks hold liquidity for two main reasons: (1) the precautionary motive and (2) the strategic motive.

The purpose of the precautionary motive is to insure a bank against its depositors' unpredictable liquidity needs, whereas the strategic motive enables it to take advantage of profitable opportunities when they arise, such as acquiring other bank assets below their market value.

2.7.7 Asset-liability management in banking

Asset-liability management (ALM) is the process whereby a bank's total assets and liabilities are controlled and managed simultaneously in an integrated fashion and forms a fundamental part of the financial management procedures of banks (Bessis, 2015; Van Greuning & Brajovic Bratanovic, 2020). Adopting a formal approach to ALM is therefore a prerequisite for an integrated approach to managing the risks associated with both on- and off-balance-sheet items. The operational aspects of ALM centre around the structuring of a bank's statement of financial position to ensure that it can maintain sufficient liquidity and an acceptable risk profile (which is aligned with its risk appetite) throughout an interest rate cycle (Dash & Pathak, 2009; Van Greuning & Brajovic Bratanovic, 2020).

ALM focuses on the timing of cash flows as bank managers are required to recognise when a bank's liabilities are due for payment (Bessis, 2015). Giandomenico (2014) and Rao (2017) agreed that ALM is concerned with the strategic management of a bank's statement of financial position since it involves risks caused by fluctuations in interest rates and exchange rates, and the liquidity position of a bank.

An efficient ALM system aims to manage the volume, mix, maturity, rate sensitivity, quality and liquidity of the assets and liabilities in order to earn an acceptable risk/reward ratio. The ultimate objective is to enable a bank to enhance its value while providing sufficient liquidity to fund day-to-day operations (Dash & Pathak, 2009).

ALM decisions should be coordinated across the relevant operational divisions of a bank and must be effectively executed. These decisions necessitate the establishment of a formal institutional structure responsible for ALM. In most banks, this structure is an asset-liability management committee (ALCO), which should preferably include members from senior management (Van Greuning & Brajovic Bratanovic, 2020).

Halim, Karim, Mahad, Nordin and Hassan (2015) argued that ALM is a multidimensional process requiring coincident interaction among different dimensions within a bank. The position of assets and liabilities will determine the liquidity preference of a bank; thus, making it essential for banks to create strategies to utilise funds while minimising risk effectively. Banking institutions must ensure that they formulate the degree of exposure of their earnings and capital to fluctuations in interest rates. Banks must be able to demonstrate and document how this understanding influences their decision-making processes (Erwin, Abubakar & Muda, 2018).

The benefits of efficient ALM are numerous and include: (1) understanding a bank's overall position in terms of its obligations, (2) quantifying risks and risk preferences in the ALM process, (3) improving preparation for future uncertainties, and (4) gaining efficiency in bank performance (Romanyuk, 2010). Choudhry (2007) made the significant point that ALM is a strategic discipline and, therefore, should form part of the long-term strategic planning of a bank.

One of the principal motivators for incorporating and implementing ALM within banks across the globe has been the BCBS, which has formulated supervisory standards and guidelines for banks to implement in order to make ALM part of their strategic planning procedures (Choudhry, 2007; Dash & Pathak, 2009).

2.7.8 Stress testing

When the BCBS introduced the concept of stress testing in 2009, it emphasised that stress testing is expected to be a critical tool used by banks as part of their internal risk management and capital planning procedures (BIS, 2019I, Van Greuning & Brajovic Bratanovic, 2020, Dent, Westwood & Segoviano, 2016; Van Dyk, 2012).

The International Monetary Fund defined stress testing *as "…a range of techniques used to assess the vulnerability of a portfolio to major changes in the macroeconomic environment or to exceptional, but plausible events"* (Blaschke, Jones, Majnoni & Peria, 2001).

The BCBS defined stress testing as *"the evaluation of a bank's financial position under a severe but plausible scenario to assist in decision-making within the bank. The term*

'stress testing' is also used to refer not only to the mechanics of applying specific individual tests, but also to the wider environment within which the tests are developed, evaluated and used within the decision-making process" (BIS, 2009c: 2). Taskinsoy (2019) described stress testing as a simulation technique used by individual banks, bank supervisors and/or regulators, and central banks to assess the financial stability of banks by analysing the ability of banks and banking systems to withstand both endogenous and exogenous shocks under extreme but probable scenarios. Bernanke (2013) believed that stress testing complements the standard capital ratios of financial institutions by adding a more forward-looking perspective to risk management and paying particular attention to so-called tail risks. The objective of stress testing is to assess the (unanticipated) losses that a bank may incur under specific stress scenarios and the impact it may have on its business plans, risk management and management strategies (Van Greuning & Brajovic Bratanovic, 2020; BIS, 2009c). Stress testing furthermore ensures that banks have sufficient capital and liquidity to support their business operations (Fratianni & Pattison, 2015; Langley, 2013).

Two stress-testing approaches exist, namely (1) a top-down approach and (2) a bottom-up approach. With a top-down approach, the board of directors, senior management and regulators would want to know how much the loss would be if a specific adverse event occurred. A bottom-up approach (also known as a reverse stress test) starts with a known outcome (for example, a R50 million loss) and then identifies what might have caused it (Van Dyk, 2012).

Furthermore, stress testing can be categorised into two categories: (1) macroprudential stress testing and (2) microprudential stress testing. Macroprudential stress testing measures the resilience of the entire financial system to extreme but plausible events (Taskinsoy, 2013). Central banks and bank supervisors conduct macroprudential stress testing to assess the financial stability and resilience of the entire financial system with the ultimate objective of safeguarding the whole economy (Greenlaw, Kashyab, Schoenholz & Shin, 2012; Taskinsoy, 2019).

Macroprudential stress testing is traditionally a top-down procedure that applies relevant and comprehensive stresses to each bank and consistently across banks. These stresses

are thus not tailor-made for each individual bank but rather for a banking sector as a homogenous entity (Taskinsoy, 2019). It is therefore important that the top-down approach is complemented by a bottom-up approach using microprudential stress testing, where either the banks themselves or the microprudential supervisors construct specific stress scenarios for each individual bank based on their knowledge of the bank's business specifications and corresponding bank-specific risks. In this respect, good cooperation among the macroprudential supervisors, microprudential supervisors and the banking sector is needed (Dent *et al.*, 2016; Greenlaw *et al.,* 2012).

Concerning the purpose of stress tests, one can differentiate between relative- and absolute stress-testing approaches based on the reliability and interpretation of the stress test results. An absolute interpretation hinges on the ability of the analyst to construct exact scenarios and to capture relevant risks, including their interplay and integration into final outcome indicators. In practice, pure absolute treatment of stress tests is, and should be, avoided and relative interpretation of the stress-test results is considered (Dent *et al.*, 2016).

The relative purpose of stress tests follows the logic of a peer group analysis. Banks are stressed by what is considered a reasonably strong stress scenario, and bank-specific results are then compared to the peer group's average. While absolute amounts are also estimated, they are then related to the average under-capitalisation of the peer group so that individual banks are required to increase their capital to the peer group's average as a sound practice rather than by an absolute amount (Dent *et al.*, 2016).

It is vital that stress testing forms an integral part of any bank's overall risk governance and risk management culture (Van Dyk, 2012). For stress testing to be truly effective, it needs to be performed regularly and supported by the bank's board of directors and senior management (BIS, 2017b; Van Greuning & Brajovic Bratanovic, 2020). Stress testing should have a global focus and involve the expertise of financial authorities, bank executives and academics without relying on cosy scenarios that provide definite results by design (Taskinsov, 2019).

Although stress testing alone cannot address all risk management weaknesses, it should be used as a supplementary tool to enhance the risk management measures in a bank.

Stress testing has a leading role in strengthening bank corporate governance and enhancing the resilience of individual banks and the financial system (Dent *et al.*, 2016; Taskinsoy, 2019; Van Dyk, 2012).

2.7.9 Securitisation

Securitisation is a process by which banks package illiquid assets into special-purpose vehicles and then sell off the high-yielding securities generated by the underlying assets' cash flow to investors (Arif, 2020; Bessis, 2015; Wernz, 2014).

Banks act as financial intermediaries, and securitisation provides an alternative for banks to reduce their risk by diversifying their lending/credit portfolios and taking funds from depositors. Securitisation creates new profit opportunities for banks and enables banks to transfer their risk to a broader investor base (Arif, 2020; Wagner, 2007).

Before the 2007-2008 GFC, banks offloaded and distributed substantial amounts of their credit risk into the capital markets via the securitisation mechanism. The so-called "toxic assets", better known as subprime loans, were distributed into the market and the risk accompanied by these toxic assets circulated throughout the entire financial system (Bessis, 2015; Arnold, 2009).

The rating agencies acknowledged that they underestimated the risk of asset-backed bonds, and consequently, a wave of downgrades followed (Faltin-Traeger, Johnson & Mayer, 2010; Plouvier, 2017; Fligstein & Goldstein, 2010). The downgrades commanded a higher cost of funds and higher required returns, resulting in a loss of value of the downgraded assets. As a result, investors in asset-backed bonds of securitisations incurred considerable financial losses (Jaffee, Lynch, Richardson & Vannieuwerburgh, 2009; Wernz, 2014).

The impact of securitisation on a bank's risk profile is a critical concern to raise because securitisation affects risk sharing between banks and the market. Gibson, Habib and Ziegler (2014) acknowledged that securitisation could motivate some banks to take more risks, but this places additional strain on the financial stability of those banks. As a result, it has become an essential concern for bank regulators to introduce strict regulations for

securitisation, in which particular emphasis is placed on increasing the level of transparency in this process (Arif, 2020; Fligstein & Goldstein, 2010).

2.8 Conclusion

Banking systems directly impact the economic growth, sustainability and development of the global economy. As a result, banks should understand the importance of risk management and the critical role effective risk management plays in safeguarding and promoting the financial stability of the financial sector and enhancing individual banks' financial soundness. Bessis (2015) rightfully pointed out that the uncertainty of an outcome cannot be eliminated, but effective risk management techniques can manage the exposure to uncertainty.

The BIS was established to assist central banks and other financial authorities worldwide in gaining an improved understanding of the global economy, to foster international cooperation among them, and to support their efforts to achieve global monetary and financial stability (De Cos, 2020). The BIS, therefore, created the BCBS to address financial stability, improve supervisory capability and enhance the quality of banking supervision on an international basis (De Cos, 2020; BIS, 2014e).

Since banking institutions are complex by nature, it was necessary to elaborate on how these organisations function and contribute towards the financial sustainability and stability of the global economy. Specific attention was devoted to defining bank capital and the reasons for regulating bank capital. The difference between RC and EC was explained, followed by noting the importance of upholding solvency and liquidity in banking. The significance of asset- and liability management was explained as this should be included in the strategic planning procedures of banks. Stress testing was discussed next, as it is critical in strengthening banks' risk management practices and improving banking institutions' resilience. The chapter concluded with a discussion on securitisation, which plays a vital role in the transference of risk between banks and the market, consequently necessitating strict oversight by bank regulators.

In the next chapter, the Basel regulatory frameworks will be discussed.

Chapter 3 - The evolution of the Basel regulatory frameworks

3.1 Introduction

Research conducted by Caprio and Klingebiel (1997) established that problems in the banking sector affect the entire financial system. Crockett (1996) further recognised that the high degree of interconnectedness among financial institutions and the system-wide consequences of bank failures severely impact the global economy. In order to reduce the likelihood of such events or even to eliminate the possibility of a banking crisis, bank regulation is essential (Acharya, 2009; Bessis, 2015).

However, preventing a financial crisis is not the only reason for bank regulation. According to Schooner and Taylor (2010), information asymmetry provides a further rationale for bank regulation as it is integral to customer protection. Griffith-Jones and Persaud (2008) also pointed out that the regulation of banks should not be over-complicated, and RC should be accurately aligned with the risks banks face.

In an attempt to create a common regulatory standard and respond to the growing instability among banks, specifically during the 1980s and again in the 2000s, the BIS developed the Basel regulatory frameworks (Witte & Deuchert, 2012).

The purpose of this chapter is to address the following secondary research objectives:

- To obtain a broad overview of the Basel I-, Basel II- and Basel III regulatory frameworks (SRO_5).
- To investigate the purpose and improvements of each pillar of the three Basel regulatory frameworks (SRO_6).
- To obtain a thorough understanding of how operational risk management is addressed by the regulatory frameworks and ought to be managed by banking institutions (SRO_7).
- To identify and analyse each regulatory framework's strengths and weaknesses. (SRO_8).

This chapter will focus on the development of the three Basel regulatory frameworks. The evolution of these frameworks is of particular importance and will assist understanding in the following ways:

- First, to study how the pillars of the Basel I- and Basel II regulatory frameworks evolved through modifications and improvements, eventually to result in the Basel III regulatory framework. Attention will be focused on the complexity of these regulatory frameworks and their implementation challenges, especially for banks in developing countries such as Ghana.
- Secondly, to identify and analyse the criticisms and the positive characteristics of each regulatory framework in order to develop guidelines to assist banks operating in Ghana with the governance and management of operational risk as mandated by the Basel regulatory frameworks.
- Finally, to enable this research to serve as a basis for providing guidelines to improve the operational risk management practices of banks operating in Ghana, and to support these banks in complying with the requirements of the Basel III regulatory framework.

Section 3.2 will focus on the Basel I regulatory framework, followed by a discussion of the Basel II regulatory framework in Section 3.3. The chapter will conclude with a discussion of the Basel III regulatory framework in Section 3.4. Each Basel regulatory framework will be considered in terms of its composition, criticisms and positive characteristics.

3.2 The Basel I regulatory framework

3.2.1 Background

The banking crisis of the early 1980s and the fact that internationally active banks were able to avoid regulatory authorities by relocating their operations to countries with less stringent regulations prompted member countries of the BCBS to develop a common banking capitalisation standard to stabilise and supervise banking activities (Bjarnesjo & Lundberg, 2013; Brownbridge, 2014, Goodhart, 2011).

In 1988, the BCBS published the Basel I regulatory framework, generally known today as Basel I. The purpose of the Basel I regulatory framework was to secure international convergence of supervisory regulations governing the capital adequacy of international banks by providing clear guidelines to banks to hold adequate capital reserves in order to fund their daily operations. In doing so, two additional objectives emerged from this regulatory framework (Balthazar, 2006; BIS, 1988; Brownbridge, 2014):

- Strengthening the soundness and stability of the international banking system.
- Diminishing existing sources of competitive inequality among international banks.

It is, however, important to emphasise that the Basel I regulatory framework was not developed to protect banks from external risks caused by fluctuations in exchange rates or interest rates, or to protect banks from other macroeconomic complications. It was, in fact, developed to assist banks in holding adequate capital reserves in order to manage risk (Bjarnesjo & Lundberg, 2013; Toniolo & Clement, 2005).

The Basel I regulatory framework was designed to fit, and to be implemented in, only the member countries: all perceived as being developed economies. It was, therefore, not optimal for developing or emerging economies with their unique risks and regulatory problems (Balthazar, 2006; Bjarnesjo & Lundberg, 2013; Demirgüç-Kunt & Detragiache, 2011).

The Basel I regulatory framework consisted of four pillars: (1) Minimum capital requirements, (2) Risk weighting, (3) A target standard ratio, and (4) Transitional and implementation agreements (BIS, 1997; Bjarnesjo & Lundberg, 2013; Goodhart, 2011).

3.2.2 The four pillars of the Basel I regulatory framework

The four pillars of the Basel I regulatory framework will be elaborated on in the following sub-sections.

3.2.2.1 Pillar 1- Minimum capital requirements

Pillar 1 prescribed the sources of capital that banks should include in their capital reserves and the amount of each source of capital a bank should hold. These sources of capital were subdivided into two tiers.

The first tier, *Tier 1 capital*, also known as *core capital*, included capital arising from sales of common shares and preference shares as well as cash reserves held by banks. The second tier, *Tier 2 capital* or *supplementary capital,* included several sources of capital, which included the holdings of subordinated debt, reserves held to cover potential loan losses, hybrid debt or equity instrument holdings, and potential gains from the future sales of assets (Demirgüç-Kunt & Detragiache, 2011; Goodhart, 2011).

The Basel I regulatory framework requirements stipulated that banks should hold an equal proportion of Tier 1 and Tier 2 capital in relation to their total capital holdings (Bjarnesjo & Lundberg, 2013; Brownbridge, 2014; Demirgüç-Kunt, & Detragiache, 2011; Tarullo, 2008).

3.2.2.2 Pillar 2- Risk weighting

Pillar 2 regulated the risk weighting of a bank's asset book. The risk-weighting system is an assets classification system to determine the minimum capital banks should hold as a reserve to minimise and protect themselves against the risk of insolvency. Therefore, the total value of all bank assets is weighted according to their particular level of risk (Brownbridge, 2014; Girling, 2014; Goodhart, 2011).

Bank assets with low risk were counted lower than their real value and, consequently, required less capital holding. Bank assets with high risk were counted at 100% of their real value and needed higher capital holding. The risk-weighting system was applied so that assets weighted at 100% accrued the maximum capital requirement of 8%[12] of the real value of the asset, whereas assets weighted at 50% would require a capital ratio of 8% of 50% of the real value of the asset (Brownbridge, 2014; Girling, 2014; Sadien, 2017).

In order to utilise this risk-weighting system, a bank's asset book had to be divided into five subgroups, comprising all the different assets included on the statement of financial position. The first subgroup weighted assets at 0% of the assets' real value and was classified as "riskless". These assets included cash holdings, sovereign debt holdings

[12]The BCBS set a target standard ratio of capital to weighted risk assets at 8% (of which the core capital component should be at least 4%). This was intended as a common minimum standard that international banks in member countries should have met by the end of 1992, thus allowing a transitional period of four years for any adjustments by banks that needed time to build up to those levels of capital (BIS, 1988).

funded in domestic currency, and debt and claims on the Organization for Economic Cooperation and Development (OECD)[13] central governments. The second subgroup weighted assets at 20% of the assets' real value and was classified as "low-risk" assets. These assets included short-term self-liquidating trade-related contingent liabilities arising from the movement of goods and multilateral development bank debt, bank debt produced by OECD banks, and non-OECD bank debt with a maturity of fewer than 12 months. The third subgroup weighted assets at 50% of the assets' real value and was classified as "moderate-risk" assets, comprising performance bonds, bid bonds, warranties and residential mortgages. The fourth subgroup was weighted at 100% of the assets' real value and was classified as "high-risk" assets. These assets included non-OECD bank debt with a maturity of more than 12 months, claims on the private sector and equity assets belonging to the bank. The fifth and final subgroup was classified as "variable assets", and they included assets from the internal public sector. These assets were weighted at 0%, 10%, 20% or 50%, depending on the central banks' risk perception of these specific assets in that country (Brownbridge, 2014; Tarullo, 2008; Bjarnesjo & Lundberg, 2013).

The BCBS believed that it was of great importance that all off-balance-sheet activities be included within the capital adequacy framework. Therefore, the Basel I regulatory framework stipulated weighting schemes for items not included in the statement of financial position (BIS, 1988; Brownbridge, 2014).

These off-balance-sheet items[14] could be subdivided into two broad categories. The first included engagements similar to unfunded credits, which could transform assets should a particular event occur. The second comprised derivative instruments where the value of an item was a function of the variability of the underlying market parameters (BIS, 1988; Balthazar, 2006; Brownbridge, 2014; Tarullo, 2008; Bjarnesjo & Lundberg, 2013).

[13] The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental economic organisation with 37 member countries, founded in 1961 to stimulate economic progress and world trade (OECD, 2020).

[14] *Off-balance-sheet items* can be defined as items not included on the statement of financial position (Balthazar, 2006).

The BCBS firmly believed that a risk-weighting system had the following three advantages over the simpler traditional gearing approach (BIS, 1988; Brownbridge, 2014; Vousinas, 2015):

- It provided a more reliable and fairer basis for international comparisons between banking systems with different risk profiles and banking structures.
- It enabled off-balance-sheet exposures to be incorporated into the risk measurement of banks.
- It did not discourage banks from holding liquid assets which carried low risk.

3.2.2.3 Pillar 3- A target standard ratio

Pillar 3 defined the minimum requirements to protect banks from credit risk and combined the first and second pillars. Cognisant of previous consultations and preliminary testing of the Basel I regulatory framework, the BCBS decided that the minimum standards set should provide a reasonable time for international banks to comply (Bjarnesjo & Lundberg, 2013; Wandhöfer, 2014).

In addition, it was agreed that this standard should be set at a consistent level to achieve gradual, soundly based and consistent capital ratios for all international banks. Hence, the BCBS confirmed that the target standard ratio of capital to weighted risk assets should be 8% (of which the core capital element would be at least 4%). The target standard ratio was expressed as a common minimum standard, that international banks in member countries were required to meet by the end of 1992. Therefore, it allowed a transitional period of four years for any adjustments to be applied by banks who needed to build up the prescribed level of capital reserves (BIS, 1988; Bjarnesjo & Lundberg, 2013).

The BCBS further acknowledged that transitioning from existing definitions of capital and measurement methods to a new internationally agreed standard would be challenging and time-consuming. This proved to be a unique challenge for banks in developing economies, thus causing a significant time delay in implementing minimum capital standards (BIS, 1988; Nyantakyi & Sy, 2015; Wandhöfer, 2014).

3.2.2.4 Pillar 4- Transitional and implementing agreements

Pillar 4 defined the stages at which each member country's central bank was requested to develop strategies to ascertain whether the Basel regulatory framework's requirements on supervision and control were being met (Bjarnesjo & Lundberg, 2013; Van Roy, 2005).

The BCBS member countries successfully implemented the framework during the planned four-year period; except for Japan which suffered from a financial recession in the late 1980s and was granted an additional four years to complete implementation (Bjarnesjo & Lundberg, 2013). In 1996, all BCBS member countries had successfully adhered to the Basel I regulatory framework (Bjarnesjo & Lundberg, 2013; Van Roy, 2005).

The Basel I regulatory framework was internationally argued and accepted as a safety- and soundness standard to protect international and local banks from insolvency. However, regulators soon questioned whether the Basel I regulatory framework adequately captured the risks posed by the banking system's increasingly complex and volatile financial markets. Furthermore, it became clear that banks could manipulate the financial system by moving assets off their balance sheets and using their portfolios to minimise their required capital while not necessarily minimising their actual risk exposure (Benink & Wihlborg, 2002; Girling, 2014; Mostert, 2013).

Sections 3.2.3 and 3.2.4 discuss the criticisms and positive characteristics of implementing the Basel I regulatory framework.

3.2.3 Criticism of the Basel I regulatory framework

Despite the widespread application of the Basel I regulatory framework and the fact that it significantly contributed to improving the financial stability of the global economy as well as levelling the playing field for both international and local banks in different countries (Balthazar, 2006), the framework was criticised on several grounds (Ojo, 2010; Saidenberg & Schuermann, 2003; Stephanou & Mendoza, 2005).

The following criticisms were levelled at the Basel I regulatory framework (Balthazar, 2006; Ojo, 2010; Saidenberg & Schuermann, 2003; Stephanou & Mendoza, 2005):

- **No recognition of diversification benefits:** Capital treatment was not differentiated when banks had well-diversified loan portfolios versus loan portfolios that were very concentrated and, therefore, incurred more risk.
- **Incomplete coverage of risk sources:** The Basel I regulatory framework focused only on the management of credit risk and did not include the management of other vital risk types which were of particular importance to banks, such as market risk, operational risk, interest rate risk, reputational risk and strategic risk.
- **No incentives for improved overall risk measurement and management:** The Basel I regulatory framework did not provide adequate incentives to encourage improvements in the financial infrastructures of banks and did not promote enhancements in the risk management- and risk governance structures of banks: owing to this limitation, there was an excessive reliance on the false comfort created by the prescribed high capital adequacy ratios.
- **A one-size-fits-all approach was unrealistic:** The Basel I regulatory framework requirements were virtually identical for all banks without paying attention to the diverse operations, level of sophistication, and risk profiles of respective banks.
- **An arbitrary measure:** The standard target ratio of 8% was subjective and not based on adequate research.

In addition to the criticisms mentioned above, the following weaknesses were also identified in the literature:

First, the imprecise blanket categories used to determine an asset's risk were unrealistic as many banks in developing economies bracketed at the maximum 100% risk level. As a result, the Basel I regulatory framework failed to identify the extreme diversity within each risk category, weighting two counterparties of different risks at the same level (Mostert, 2013; Sadien, 2017).

Secondly, the risk-weighting system was inaccurate. It was argued that a bank's risk profile was likely to increase under the Basel I regulatory framework. The risk-weighting system was widely regarded as attractive in its simplicity but inaccurate in its risk measurement. It required banks to hold higher capital levels for riskier assets, imposing

a capital cost on these risky assets and driving a move towards investments in safer assets (Balthazar, 2006; Koehn & Santomero, 1990; Sadien, 2017).

Thirdly, there was a great diversity of assets within each risk band. It was argued that investments that encountered more risk within each risk band would offer higher returns, and as a result, it was favourable for banks to invest in the riskiest asset class within each risk band. Therefore, banks could take on more risk while moving towards greater investments in safer asset categories (Balthazar, 2006; Gennotte & Pyle, 1990; Koehn & Santomero, 1990; Sadien, 2017).

Fourthly, it was reported that banks responded to the Basel I regulatory framework by employing regulatory arbitrage, exploiting loopholes, and utilising unregulated areas to conceal risk from their financial statements, thereby avoiding additional capital charges. Banks utilised securitisation to weaken their capital requirements, which remained largely free of capital regulation. Securitisation generated attractive investment opportunities for investors, but the bank still carried the primary portion of the risk without requiring it to hold additional capital reserves (Balthazar, 2006; Sadien, 2017; Saidenberg & Schuermann, 2003).

Finally, it was held that the Basel I regulatory framework failed to provide adequate transparency of risks and the management of risks due to the banks' limited disclosure requirements. Consequently, bank supervisors and banks themselves had limited information concerning their overall risk profile and capital adequacy requirements. The manner in which banks and their respective supervisors responded to emerging risks was concerning because it remained questionable whether the treatment of emerging risks was conducted in a timely and effective manner (Balthazar, 2006; Sadien, 2017; Saidenberg & Schuermann, 2003).

3.2.4 Positive characteristics of the Basel I regulatory framework

The Basel I regulatory framework was successful in several ways. The first and incontestable achievement of the initiative was that it created a worldwide benchmark for banking regulations. The Basel I regulatory framework was initially designed and developed for internationally active banks of the G10 member countries. However, owing

to its obvious value, it swiftly developed into a global standard for banking regulations in most countries (Balthazar, 2006; Mostert, 2013).

Due to the framework's development, international banks were presented with a uniform set of rules and standards, which eliminated unnecessary discussions with national bank regulators concerning what the appropriate level of capital reserves should be in order to conduct business in different countries. Therefore, banks operating in different countries and competing in the same markets had equivalent RC requirements. As a result, it saved both time and money (Balthazar, 2006; Sadien, 2017).

The introduction of different risk weights for different asset classes (although not accurately reflecting the true risks of banks' credit portfolios), significantly improved the previous regulatory ratios used by numerous countries (Balthazar, 2006; Jackson, 1999).

Scholars, researchers and banking practitioners argue that, perhaps, the Basel I regulatory framework's most significant contribution was not increasing banks' capital requirements but rather igniting the ongoing process of improving banking regulations and best practices. This improvement in banking regulations paved the way for additional safety measures to be developed to protect both local and international banks, consumers and their respective economies (Balthazar, 2006; Benink & Wihlborg, 2002; Rodríguez, 2003).

The discussion above serves as an introduction to the next section, which will deal with the development of the Basel II regulatory framework − a more comprehensive framework that prescribed the minimum capital adequacy requirements for the banking sector.

3.3 The Basel II regulatory framework

3.3.1 Background

In response to the criticisms of the Basel I regulatory framework, the BCBS decided in 1999 to propose a new, more comprehensive capital adequacy framework. This new framework, formally titled: A Revised Framework on International Convergence of Capital Measurement and Capital Standards, or informally referred to as Basel II, significantly

expanded the scope, technicality and depth of the original Basel I regulatory framework (Balin, 2008; Brownbridge, 2014; Ojo, 2010).

The Basel II regulatory framework maintained the "pillar" structure of the Basel I regulatory framework. However, each pillar was greatly expanded to cover new approaches to credit risk; adjusting to the securitisation of bank assets; providing for the management of market risk, operational risk, as well as interest rate risk; and incorporating market-based surveillance and regulation (Balin, 2008; Brownbridge, 2014; Ojo, 2010).

The BCBS outlined the goal of the revised framework as follows:

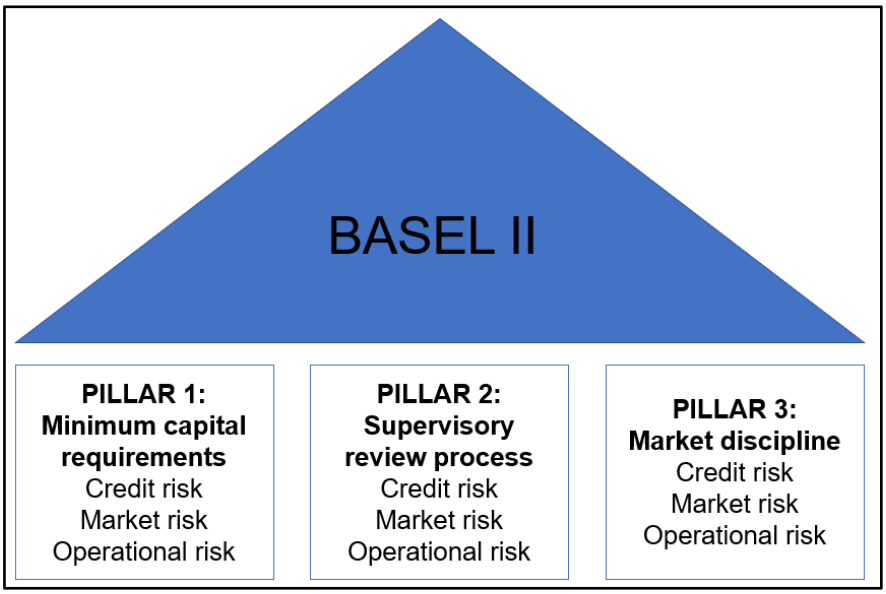
The Basel II Regulatory Framework describes a more comprehensive measure and minimum standard for capital adequacy that national supervisory authorities are now working to implement through domestic rule-making and adoption procedures. It seeks to improve on the existing rules by aligning regulatory capital requirements more closely to the underlying risks that banks are exposed to. In addition, the Basel II Regulatory Framework is intended to promote a more forward-looking approach to capital supervision. This approach encourages banks to identify the risks they may face at present times and in the future and to develop and improve their ability to manage those risks. Consequently, the new revised framework is intended to be more flexible and better able to evolve with advances in the market and risk management practices (BIS, 2012:13).

Girling (2014) stated that, on the whole, the Basel II regulatory framework was a considerable step forward to a more responsive and individually measured calculation of risk. Liste *et al.* (2012) highlighted that the advocates of the Basel II regulatory framework believed that the newly developed framework would protect the international financial system from the many problems that might arise in the unfortunate event that a major bank, or a series of banks, suffered from liquidity and solvency problems, and collapsed as a result of these problems. In the Basel II regulatory framework, the emphasis was on providing more dynamic risk-based capital requirements and increasing the market discipline of banks (Mostert, 2013; Liste *et al.*, 2012).

The Basel II regulatory framework introduced a three-tiered system of capital. The first tier (Tier 1) consisted of the highest quality and most liquid assets, including common shares and retained earnings, cash and government bonds. Tier 2 consisted of less sound assets, which were generally considered good quality, including undisclosed reserves and hybrid debt-capital instruments. Finally, Tier 3 assets were of low quality and included subordinated and unsecured debt. Banks were required to hold a minimum of 4% of their reserves in Tier 1 capital, 3.5% in Tier 2 capital and 0.5% in Tier 3 capital (Financial Stability Institute, 2004; Liste *et al.*, 2012).

In addition to the three-tiered system of capital, the Basel II regulatory framework was comprised of three pillars, as illustrated in Figure 3.1 below.

Figure 3.1: The composition of the Basel II regulatory framework



Source: Munniksma (2006).

Pillar 1 addressed minimum capital requirements. Pillar 2 focused on the supervisory review process, and Pillar 3 concentrated on market discipline (BIS, 2006a, KPMG, 2006).

The three pillars of the Basel II regulatory framework will now be elaborated on in Section 3.3.2.

3.3.2 The three pillars of the Basel II regulatory framework

3.3.2.1 Pillar 1- Minimum capital requirements

Pillar 1 displayed the most significant expansion since the Basel I regulatory framework. In response to the criticisms of the Basel I regulatory framework, the Basel II regulatory framework introduced a more sensitive measurement of a bank's RWA to eliminate the inadequacies that enabled banks to take additional risks while cosmetically easing the minimum capital adequacy requirements. The new framework's first mandate was to expand the scope of regulation to include assets of the holding companies of internationally active banks. The purpose of this expansion was to eliminate the risk of banks concealing these assets from their financial statements by transferring them to other subsidiaries. This would allow banks to incorporate the financial well-being of the entire banking institution when calculating the capital requirements for the subsidiary banks (Balin, 2008; KPMG, 2006).

Pillar 1 also contained the procedures for determining the minimum capital requirements for credit risk, market risk and operational risk, which were not included in the Basel I regulatory framework (Brownbridge, 2014; BIS, 2006a). The available approaches for managing credit-, market- and operational risk will now be discussed further.

3.3.2.1.1 Credit risk

Two methodologies were available to protect banks against credit risk exposure, enabling them to quantify credit risk as accurately as possible, therefore attaining the required capital levels to support them in their daily operations. The two methodologies utilised to rate the riskiness of a bank's assets were the standardised approach and the internal ratings-based approach (Girling, 2014; Stephanou & Mendoza, 2005).

The standardised approach measured credit risk in a similar way as prescribed by the Basel I regulatory framework but with greater risk sensitivity (Stephanou & Mendoza, 2005). This approach was designed specifically for smaller banks that could not bear the strain of adopting complex calculations. With the standardised approach, banks utilised the ratings from authorised rating institutions to assign the correct risk weightings to the different asset classes and so calculated the required capital levels (Stephanou &

Mendoza, 2005). These rating agencies included Fitch, Moody's, and Standard and Poor. Their objective was to deliver information similar to the internal risk model within banks but only for assets that required knowledge and monitoring beyond the simple risk profiles of single counterparties (Balin, 2008; Girling, 2014; Stephanou & Mendoza, 2005).

Beyond the standardised approach, the Basel II regulatory framework proposed and incentivised two alternative approaches to risk-weighting capital. Both were internal ratings-based (IRB) approaches: the Foundation IRB approach and the Advanced IRB approach (BIS, 2004; Stephanou & Mendoza, 2005).

Under both the IRB approaches, all banking-book exposures would be categorised into broad asset classes using specific definitions and criteria provided by the BCBS. For each asset class, there were well-defined risk components[15], risk-weight functions[16] and minimum requirements[17] (Balin, 2008; Girling, 2014; Stephanou & Mendoza, 2005).

The two IRB approaches were complex and relied on banks' own internal estimates of specific risk parameters to determine credit capital requirements with the assistance of their bank regulators. Under the Foundation IRB approach, banks generally provided their own probability of default (PD) estimates and relied on supervisory estimates for other risk components. Under the Advanced IRB approach, banks would provide their own estimates for all risk components (BIS, 2004; Stephanou & Mendoza, 2005).

To be eligible to use the IRB approaches, banks should have been able to demonstrate to their supervisors that they could meet specific minimum requirements at the outset and on an ongoing basis. These requirements applied to both IRB approaches and across all asset classes and could be broken down into nine dimensions (each with its own specific key minimum requirements) which included: rating system design, risk rating system operations, corporate governance oversight, use of internal ratings, risk quantification,

[15] *Risk components* are estimates of risk parameters that can be calculated by banks themselves or alternatively, are provided by bank supervisors (BIS, 2004; Stephanou & Mendoza, 2005).
[16] *Risk-weight functions* are the formulas by which risk components are transformed into risk-weighted assets (BIS, 2004; Stephanou & Mendoza, 2005).
[17] *Minimum requirements* are the minimum standards for a bank to use the IRB approach for a given asset class (BIS, 2004; Stephanou & Mendoza, 2005).

validation of internal estimated, supervisory estimates, calculation of capital charges for equity exposures and disclosure requirements (BIS, 2004).

The IRB approaches held significant benefits for banks and bank regulators. First, the IRB approaches enabled banks to engage in self-surveillance. Excessive risk-taking would cause banks to hold additional capital as they would be more cognisant of their risk exposure. Secondly, for bank regulators, the self-surveillance of banks would decrease the cost of bank regulation and reduce the potential legal disputes with banks that failed to comply with regulations (Balin, 2008; Girling, 2014).

Finally, the "tailored" approach of risk weights calculated by individual banks enabled additional capital to be channelled to the private sector, increasing the depth of banking institutions. This channelling of capital to the private sector promoted the financial stability of the banks and stimulated economic growth in that particular country (Balin, 2008; Girling, 2014).

3.3.2.1.2 Market risk

The second risk evaluated by Pillar 1[18] of the Basel II regulatory framework attempted to quantify the capital requirements needed by banks owing to their exposure to market risk (BIS, 2006a; Bessis, 2015).

Pillar 1 provided two alternative methods to calculate capital reserves for market risk: the standardised approach and the internal-models approach. Under both approaches, the capital requirements were based on the VaR approach. With the standardised approach, banks utilised the specific guidelines set by Pillar 1 to calculate their capital requirements. With the internal-models approach, banks developed their own models to calculate their capital requirements; but this had to be approved by the country's banking regulator before banks were permitted to implement it (BIS, 2006a; Balin, 2008; Bessis, 2015; Girling, 2014).

[18] Pillar 1 describes the procedures for determining the minimum capital requirements for credit risk, market risk and operational risk. Refer to Section 3.3.2.1 for additional information on Pillar 1.

3.3.2.1.3 Operational risk

The Basel II regulatory framework extended its scope into the assessment of and protection against operational risks. Pillar 1 offered three possible methods to calculate the capital requirements for operational risk, which included: the basic indicator approach (BIA), the standardised approach (TSA) and the advanced measurement approach (AMA) (BIS, 2006a; Balin, 2008; Bessis, 2015; Guttmann, 2011).

Under the BIA, banks had to hold capital reserves equal to 15% of the average gross income earned by a bank in the past three years. Under the TSA, the bank's activities were divided by their business lines to determine the amount of capital reserves they should have to protect themselves against operational risks (BIS, 2006a; Bessis, 2015; Balin, 2008; Guttmann, 2011).

Table 3.1 below illustrates the reserve targets specified for each business line.

Table 3.1: Standardised approach reserve targets

Beta values	Business lines	Beta factors
β_1	Corporate finance	18%
β_2	Trading and sales	18%
β_3	Retail banking	12%
β_4	Commercial banking	15%
β_5	Payment and settlement	18%
β_6	Agency services	15%
β_7	Asset management	12%
β_8	Retail brokerage	12%

Source: BIS (2019c).

Figure 3.1 shows that different capital reserve targets were required for the various business lines of a bank. An 18% capital reserve target was required for each of the following: corporate finance, sales and trading, and payment and settlement; whereas commercial banking and agency services required a capital reserve target of 15%. Retail banking, asset management and retail brokerage required a lower capital reserve target of 12% (Balin, 2008; BIS, 2011b).

For a bank to use the TSA, as opposed to the BIA, to determine the operational risk capital charge, adherence to the following general criteria was required; which also needed the approval of the bank supervisor (Embrechts & Hofert, 2011; Guttmann, 2011):

- The board of directors and senior management needed to be actively involved in the operational risk management framework of the bank.
- The bank needed to have a conceptually sound operational risk management system which was implemented with integrity.
- The bank needed to have sufficient resources in the major business lines.
- The bank needed to have a documented set of criteria for mapping gross income for their business lines and activities.

If the bank was internationally active, then the following additional criteria needed to be met (Embrechts & Hofert, 2011; Guttmann, 2011):

- Responsibilities within the operational risk management system should be assigned to an operational risk management function.
- The bank should systematically track relevant operational risk data through each separate business line.
- Operational risk exposures should regularly be reported on to business unit management, senior management and the board of directors.
- The operational risk management system should be thoroughly documented.
- The operational risk management processes should be subject to validation and regular independent review.
- The operational risk assessment system should regularly be reviewed by external auditors or bank supervisors.

The AMA allows banks to develop their own risk-based models for calculating operational risk capital. With this approach, the Basel II regulatory framework intentionally gave banks a significant degree of flexibility to encourage the growth of market discipline and to foster self-surveillance in banking legislation (Balin, 2008; Girling, 2014; Mostert, 2013; Embrechts & Hofert, 2011).

For banks to use the AMA, as opposed to the TSA, the bank needed to meet the general criteria of the TSA, as well as the following qualitative and quantitative criteria (Embrechts & Hofert, 2011; Guttmann, 2011):

Qualitative criteria:

- The bank should have an independent operational risk management function responsible for designing and implementing the operational risk management framework.
- The internal operational risk measurement system should be integrated into the day-to-day risk management processes.
- The bank should have prescribed techniques for allocating operational risk capital to major business lines.
- Operational risk exposures should regularly be reported on to business unit management, senior management and the board of directors.
- The operational risk management system should be thoroughly documented.
- The operational risk management processes should be subject to validation and regular independent review by internal and/or external auditors.
- The operational risk assessment system should regularly be reviewed by external auditors or bank supervisors.
- External auditors or supervisory authorities should validate the operational risk measurement system and ensure that the internal validation processes are operating correctly and that the risk measurement system is transparent.

Quantitative criteria:

- The bank should be able to demonstrate that its approach can capture potentially severe tail-loss events.
- The bank should have and should maintain rigorous procedures for operational risk model development and validation.
- Any internal operational measurement system should be consistent with the prescribed scope of operational risk.

- The bank will be required to calculate its RC charge as the sum of expected and unexpected losses.
- The risk measurement system should be sufficiently sensitive to capture the major drivers of operational risk.
- Risk measures for the different operational risk estimates should be added when calculating the minimum capital requirement. The bank may, however, use internally determined correlations in operational risk losses, provided that these correlations are determined by sound methods and implemented with integrity while considering the uncertainty of the correlation estimates. The correlation assumptions should be validated using appropriate quantitative and qualitative techniques.
- Any operational risk measurement system should use the four data elements[19]: (1) internal data, (2) relevant external data, (3) scenario analysis and (4) business environment and internal control factors. In addition, the bank will be required to have a credible, transparent, well-documented, and verifiable approach for weighting these four data elements.

It is important to note that banks were subject to a period of initial monitoring by the bank supervisor before the AMA approach could be implemented for regulatory purposes (Embrechts & Hofert, 2011; Guttmann, 2011; BIS, 2019c).

3.3.2.2 Pillar 2- Supervisory review process

The content of Pillar 2 focused on providing key principles for supervisors to review the banks' adherence to the Basel II regulatory framework. In addition, it guided risk management practices and promoted supervisory transparency and accountability with respect to banking risks.

[19] For each of the four data elements (internal data, external data, scenario analysis, and business environment and internal control factors) there are specific requirements that a bank should adhere to. This, however, falls outside the scope of this study.

Pillar 2 outlined how regulators were expected to enforce soundness standards and provided a mechanism for additional capital requirements to cover any material risks that had not been appropriately captured in Pillar 1 (Brownbridge, 2014; Girling, 2014).

Pillar 2 comprised four principles:

- Principle 1 advocated that banks should have appropriate methods in place to determine their overall capital adequacy in relation to their risk profiles and a strategy for sustaining their capital levels. These processes required board and senior management oversight, sound capital assessment and a comprehensive risk management system (Alexander, 2004; Balin, 2008).
- Principle 2 advocated that bank supervisors review and evaluate banks' internal capital adequacy determinants and strategies and their ability to monitor and ensure compliance with RC ratios. It was the bank supervisors' responsibility to take the required supervisory action if they were not satisfied with the outcome of the process. In addition, bank regulators were given the authority to hold senior management responsible in the unfortunate event that a bank misrepresented its risk positioning. The Supervisory Review and Evaluation Process (SREP) undertaken by the banking regulator included a combination of on-site examinations, off-site reviews, discussions with banks' management teams and the review of external auditors' work (Alexander, 2004; Balin, 2008).
- Principle 3 advocated that bank supervisors should urge banks to operate above the minimum RC ratio and hold capital above the minimum capital requirements as prescribed by the Basel II regulatory framework. This safety measure contributed to the resilience of the capital requirement system (Alexander, 2004; Balin, 2008).
- Principle 4 advocated that bank supervisors act proactively to prevent capital from falling below stipulated minimum levels. Supervisors were authorised to prescribe immediate corrective measures when such situations occurred (Alexander, 2004; Balin, 2008).

3.3.2.3 Pillar 3- Market discipline

Pillar 3 provided banks with methods to disclose risk management- and capital calculation practices to the general public.

The purpose of Pillar 3 was to increase the transparency of the banking industry's risk management practices and allow investors and shareholders to understand banks' inner risk management practices. As a result, banks were encouraged to disclose accurate, transparent information regarding their capital position empowering shareholders to enforce strict discipline in banks' risk-taking and reserve capital-holding methods (Balin, 2008; Brownbridge, 2014; Carvalho, 2005; Girling, 2014).

In Sections 3.3.3 and 3.3.4, the criticisms and the positive characteristics of the Basel II regulatory framework are discussed.

3.3.3 Criticisms of the Basel II regulatory framework

The BCBS specifically stated that the Basel II regulatory framework's recommendations were developed for its G-10 member states. Thus, the recommendations were inappropriate for developing economies, and attempts to comply had numerous problematic consequences for these economies (Balin, 2008; Barth, Caprio & Levine, 2006). Many of the issues that posed problems for developing economies in 1999, when Basel II was introduced, continue to challenge these economies to this day. These challenges are examined in Sections 3.3.3.1. to 3.3.3.5.

3.3.3.1 Complexity

The Basel II regulatory framework abandoned the original objective of simplicity. The methods introduced to calculate capital requirements entailed complex internal modelling systems that proved problematic for banks and bank supervisors, who were obliged to validate these methods. Banks in developing countries, especially in Africa, needed more human resources and system capacity to provide a sound supervisory review capability (Alexander, 2004; Carvalho, 2005; Mostert, 2013).

The complexity involved in the Basel II regulatory framework and the inclusion of internal mechanisms in measuring risk made it essential for regulators to appoint and retain highly

skilled employees over the medium to long term. Unfortunately, the educational institutions required to train such employees did not exist in most of developing countries, and the regulatory authorities did not have the financial resources to appoint costly high-skilled employees (Balin, 2008; Barth *et al.*, 2006).

3.3.3.2 Cost of compliance

Mostert (2013) highlighted that it is questionable whether the cost incurred to implement the Basel II regulatory framework requirements was worth the benefits for banks situated in developing countries. The cost of developing internal models for calculating the capital- and liquidity requirements would confine most banks to TSA. This equated to omitting the key benefits of the Basel II regulatory framework, which was to link the more dynamic capital requirements to the individual risk profile of a bank and to create a level playing field and international comparability for banking institutions (Barth *et al.*, 2006; BIS, 2004; Mostert, 2013).

Within the Basel II regulatory framework, there were many ambiguous areas without precise instructions to bank supervisors regarding what exactly was expected from them. These complex and demanding regulations raised the cost of compliance since substantial demands were placed on bank supervisors regarding qualifications and competencies (Balin, 2008; Barth *et al.*, 2006).

3.3.3.3 Procyclicality

The procyclical nature of capital posed another challenge. The dilemma was that when there is a boom in economic activity, low unemployment and moderate inflation, the risk of bank facilities defaulting is low. This low risk requires banks to hold fewer capital reserves. However, banks will have to hold more capital reserves in adverse economic conditions because the RWA will be higher owing to the increased risk of bank defaults. Therefore, it can be argued that the capital requirements of banks follow economic cycles. The actual problem occurs in adverse economic cycles. Banks struggle to hold additional capital reserves due to higher funding costs. As a result, the banks' market value of shares declines as investors perceive the future yield capacity of banks as unfavourable. In the

most severe scenarios, banks collapse or seek bailouts[20]. Forced mergers and takeovers become the norm, which reduces competition and leads to more monopolistic behaviour. Therefore, the response strategy for banks is to cut back on their lending capacity to the economy. The consequence of this strategy leads to economic contraction, which contributes to the emergence of an economic recession (Balin, 2008; Gordy & Howells, 2006; Jayadev, 2013).

3.3.3.4 Availability of skills

If banks operating in developing countries found it challenging to comply with the Basel II regulations at the turn of the century, two decades later, many of them are still not in a position to do so. The pressure on banks to generate and continuously introduce financial innovations requires bank supervisors to update and improve their skills and capabilities constantly. This poses a substantial challenge for developing countries where there is a dearth of appropriate skills and competencies. This issue cannot be ignored by banks situated in Africa (Carvalho, 2005).

Brownbridge (2015) indicated that bank supervisory agencies in most African countries (except for South Africa and Mauritius) did not have sufficiently qualified staff to monitor the use of internal bank models for estimating risk, and most banks did not have the technical capacity to utilise these models.

3.3.3.5 Inflow of foreign funds

Lending to banks in developing economies posed another challenge. In the first instance, because only large organisations could afford to appoint rating agencies to assess their debt positions, it was likely that many banks in developing countries would not have their debt rated by rating agencies such as Moody's, Standard & Poor, or Fitch. As a result, global banks would be less inclined to loan money to banks in developing economies because these loans would have to be matched with more extensive capital reserve requirements (Balin, 2008; Barth *et al.,* 2006; Bessis, 2015).

[20]*Bank bailouts* are government interventions into the economy, where financial assistance is provided to banks that are dangerously close to bankruptcy – in an attempt to save the bank from becoming insolvent (Grossman & Woll, 2014; Rosas, 2006).

3.3.4 Positive characteristics of the Basel II regulatory framework

In 2006, a study conducted by the accounting and auditing firm Klynveld Peat Marwick Goerdeler (KPMG) found that the benefits of the Basel II regulatory framework were primarily related to improved risk management practices for banking institutions. These benefits specifically included: (1) fewer defaults owing to improved insight into a client's risk profile, (2) lower cost of funding capital due to improved credit ratings, and (3) the empowerment of banks to enter riskier business segments (KMPG, 2006).

Gordy and Howells (2006) pointed out that the Basel II regulatory framework allowed banks greater flexibility in complying with the capital adequacy regulations and in designing their risk management frameworks. The Basel II regulatory framework significantly improved banking institutions' risk management practices (Balthazar, 2006; BIS, 2004; Stephanou & Mendoza, 2005). It also improved the safety and soundness of banks because of a more risk-sensitive approach (Herring, 2005).

In the next section, the development of the Basel III regulatory framework will be discussed.

3.4 The Basel III regulatory framework

3.4.1 Background

The 2007-2008 GFC demonstrated that bank failures lead to major economic disruptions, which can, in turn, cause severe negative consequences and even economic recession in some countries. The outbreak of the 2007-2008 GFC emphasised the fragility of the efficient market hypothesis (EMH)[21] and cautioned the international financial community about the effectiveness of the Basel II regulatory framework (Liste *et al.*, 2012; Jenkins & Masters, 2010).

[21] The theory of the EMH describes the behaviour of an assumed 'perfect' market in which (1) securities are in equilibrium, (2) security prices fully reflect all public information available and react swiftly to new information, and (3) because shares are fully and fairly priced, investors do not waste time to search for mispriced securities (Gitman *et al.*, 2014).

The importance of regulating capital adequacy, liquidity- and solvency levels of banks that operate both locally and internationally, and guiding banks by superior standards of corporate governance, cannot be over-emphasised. Hence the need for a new and improved Basel regulatory framework (Bjarnesjo & Lundberg, 2013; Liste *et al.,* 2012; Sadien, 2017; Taylor, 2011).

In December 2010, the BCBS approved the Basel III regulatory framework, effective from 2013 and still in effect today. The newly developed framework is a global regulatory standard on capital adequacy, liquidity management and stress testing, agreed upon by the member countries of the BCBS. The purpose of the framework is to strengthen global capital and liquidity regulations to promote a more resilient banking sector and improve the banking sector's ability to absorb financial and economic shocks (Bjarnesjo & Lundberg, 2013; Sadien, 2017).

The Basel III regulatory framework introduced a system-wide approach at the macroprudential level by announcing new measures and improvements on many aspects of the previous two regulatory frameworks, mainly relating to capital requirements and risk coverage (BIS, 2011a; BIS, 2019c; Bjarnesjo & Lundberg, 2013; Sadien, 2017).

In the section that follows, the three pillars of the Basel III regulatory framework will be discussed.

3.4.2 The three pillars of the Basel III regulatory framework

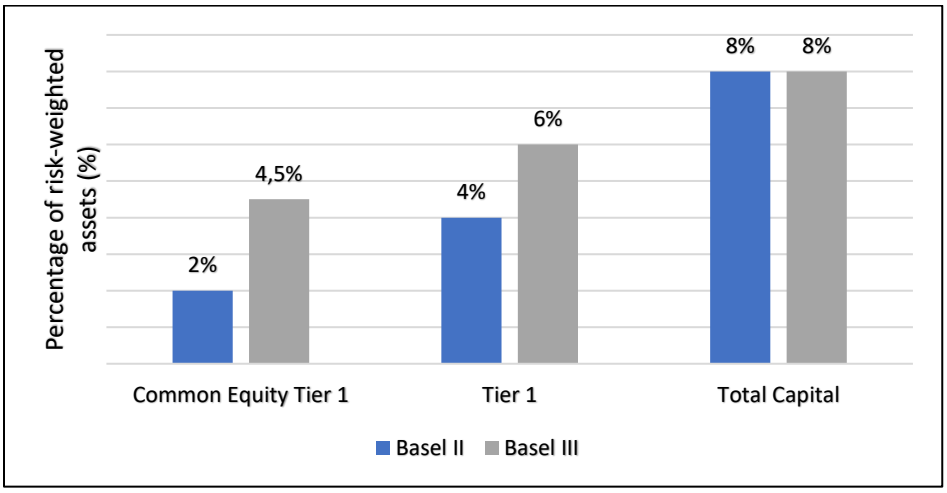
The Basel III regulatory framework utilises a similar structure as the Basel II regulatory framework. However, it was modified to increase the effectiveness and efficiency of the way banking institutions manage the various risks to which they are exposed. The Basel III regulatory framework imposes stricter regulations on banks' minimum capital- and liquidity requirements and addresses acceptable levels of leverage (Bjarnesjo & Lundberg, 2013; BIS, 2011a; Hannoun, 2010).

These regulations will be elaborated on in Sections 3.4.2.1 to 3.4.2.3 below.

3.4.2.1 Pillar 1: Enlarged minimum capital and liquidity requirements

Pillar 1 regulates the minimum capital requirements of banks, which the regulatory authorities should monitor. With the new regulatory framework, the additional focus on increased capital control measures is pertinent. The modifications in Pillar 1 of the Basel III regulatory framework compared to the Basel II regulatory framework are illustrated in Figure 3.2 below.

Figure 3.2: Minimum capital requirements: A comparison between the Basel II- and Basel III regulatory frameworks



Source: Babic (2011).

Figure 3.2 illustrates the pertinent changes in the minimum capital requirements in the Basel III regulatory framework, which include the following (BIS, 2011a; BIS, 2019b; Bjarnesjo & Lundberg, 2013; Hannoun, 2010):

- The common equity increases from 2% to 4.5% of the RWA.
- The total amount of Tier 1 capital increases from 4% to 6% of the RWA.
- The total sum of Tier 1 and Tier 2 capital is set at 8% of the RWA.

The additional modifications and improvements to Tier 1, Tier 2 and Tier 3 will be discussed below.

3.4.2.1.1 Tier 1 capital

Under the Basel III regulatory framework, Tier 1 capital is divided into: Common equity Tier 1 capital (CET 1) and Additional Tier 1 capital. CET 1 capital comprises: (1) common equity, (2) a capital conservation buffer, (3) a countercyclical buffer, and (4) a systemic addition for banks (BIS, 2011a; Bjarnesjo & Lundberg, 2013; Sadien, 2017).

The definition of common equity remains unchanged in the Basel III regulatory framework. However, a capital conservation buffer is established to serve as a safety buffer during periods of financial stress and is set at 2.5% above the minimal Tier 1 capital requirements. A countercyclical buffer is introduced to eliminate the effect of procyclicality that is dependent on macroeconomic fluctuations and the economic conditions of a particular country. The purpose of the countercyclical buffer is to protect banks from periods of excessive (credit) growth and is set to fall within a range of 0-2.5% of RWA. The systemic addition to the tier capital applies explicitly to large banks, which have a significant impact on national and global financial markets and is set within a range of 1-2.5% of RWA (BIS, 2011a; Bjarnesjo & Lundberg, 2013; Juks & Melander, 2012; Sadien, 2017).

Additional Tier 1 capital comprises common equity but is reduced from 2% of Tier 1 capital to 1.5% of Tier 1 capital with no maturity date (BIS, 2011a; Bjarnesjo & Lundberg, 2013).

3.4.2.1.2 Tier 2 capital

Tier 2 capital is defined in the Basel III regulatory framework as: (1) capital that can absorb losses on a "gone-concern"[22] basis, or (2) capital that absorbs losses during periods of insolvency before depositors lose any money (BIS, 2011a; BIS, 2019b). This source of capital will, therefore, only be utilised in circumstances when a bank encounters the risk of liquidation − and it is reduced from 3.5% of RWA (in the Basel II regulatory framework) to 2% of RWA (BIS, 2011a; Bjarnesjo & Lundberg, 2013; Sadien, 2017).

[22] *Gone-concern* can be defined as a financial institution that is in the process of being liquidated (Pfetsch, Poppensieker, Schneider & Serova, 2011).

3.4.2.1.3 Tier 3 capital

Tier 3 capital is eliminated from the definition of capital in the Basel III regulatory framework (BIS, 2011a; Sadien, 2017).

Pillar 1, in addition, addresses the challenges of risk coverage and the manner in which banking institutions should manage risks when conducting their business operations. Similar to the Basel II regulatory framework, the Basel III regulatory framework addresses three specific risk types: credit risk, market risk and operational risk (BIS, 2011a; BIS, 2017a; Brownbridge, 2014; Bjarnesjo & Lundberg, 2013). The available approaches for managing credit-, market- and operational risk will now be discussed in Sections 3.4.2.1.4 to 3.4.2.1.5.

3.4.2.1.4 Credit risk

The Basel III regulatory framework revises both the standardised- and internal rating-based approaches regarding credit management (BIS, 2017a; BIS, 2019m).

The revisions to TSA include the following (BIS, 2017a; BIS, 2019m):

- A more granular approach is developed for unrated exposures to banks and for rated exposures in countries where the use of credit ratings is permitted.
- Some of the risk weights for rated exposures are recalibrated. In addition, the risk-weighted treatment for unrated exposures is more granular than the existing flat risk weight.
- For residential real estate exposures, more risk-sensitive approaches are developed, and risk weights are allowed to vary instead of using a single risk weight.
- For retail exposures, a more granular treatment distinguishes between different types of retail exposures.
- For subordinated debt and equity exposures, a more granular risk-weight treatment applies.
- For off-balance sheet items, the credit conversion factors (CCFs) (which are used to determine the amount of an exposure to be risk-weighted) are made more risk-

sensitive and include the introduction of positive CCFs for unconditionally cancellable commitments (UCCs).

In the Basel II regulatory framework, two main IRB approaches existed, which included the Foundation IRB (F-IRB) and the Advanced IRB (A-IRB) (BIS, 2019m). The 2007-2008 GFC highlighted several shortcomings related to the use of IRB approaches for credit risk. These shortcomings included: (1) the excessive complexity of the IRB approaches, (2) the lack of comparability in banks' internally modelled IRB capital requirements, and (3) the lack of robustness in modelling certain asset classes (BIS, 2017a; BIS, 2019m).

To address these shortcomings, the BCBS made the following revisions to the IRB approaches in the Basel III regulatory framework (BIS, 2017a; BIS, 2019m):

- The option to use the Advanced IRB (A-IRB) approach for certain asset classes is removed.
- The input floors (for metrics such as probabilities of default (PD) and loss-given-default (LGD)) are adopted to ensure a minimum level of conservativism in model parameters for asset classes where the IRB approaches remain available.
- Greater specification of parameter estimation practices to reduce RWA variability is provided.

Table 3.2 outlines the revised scope of approaches available in the Basel III regulatory framework for banking institutions (relative to the Basel II regulatory framework).

Table 3.2: Revised scope of IRB approaches for asset classes

Portfolio/exposure	Basel II: Available approaches	Basel III: Available approaches
Banking institutions	A-IRB, F-IRB, SA	F-IRB, SA

Source: BIS (2019c).

These revisions enhance the Basel III regulatory framework in the following ways (BIS, 2017a; BIS, 2019m):

- It restores a level playing field among banks.
- It increases comparability across banks.

- It reduces reliance on credit ratings by requiring banks to conduct sufficient due diligence.
- It develops a sufficiently granular non-ratings-based approach for banks in countries that cannot, or do not wish to, rely on external credit ratings.

3.4.2.1.5 Market risk

Similar to the Basel II regulatory framework, the Basel III regulatory framework prescribes two methodologies banks can adopt to manage market risk. These are the standardised approach (SA) and the internal-models approach (IMA) (BIS, 2019d; BIS, 2019e; BIS, 2019f; PwC, 2016).

The SA is improved by developing specific guidelines, processes and methods to calculate the capital requirements for each market-risk category (interest rate risk, equity risk, foreign exchange risk, commodities risk and price risk) (BIS, 2019e). These revised guidelines, methods, and processes represented a significant revision of the SA in the Basel II regulatory framework. Therefore, banks will be required to devote a significant number of resources to successfully implement the SA under the Basel III regulatory framework since it requires a series of techniques, guidelines and criteria that needs to be adhered to (BIS, 2018d; BIS, 2019e; PwC, 2016).

For the IMA, the following modifications, additional guidelines and criteria are developed in the Basel III regulatory framework. These criteria will now be discussed.

The IMA no longer utilises the VaR approach, where a 99% quantile was used to calculate the capital requirements for market risk. It now makes use of an expected shortfall at a 97.5% quantile. The BCBS made this revision because the VaR approach did not capture tail risks.[23] These tail risks can lead to unwanted risk-taking and, therefore, makes the expected shortfall approach more accurate for calculating capital requirements for market risk (BIS, 2019f; PwC, 2016).

[23] *Tail risks* are high-impact events with a low probability of occurring. Although the probability of such an event is very low, it could have a significant negative outcome on investment portfolios and on financial markets (PWC, 2016).

An important part of the IMA is the specification of a suitable set of market-risk factors by banks. Discretion in the specification process of these market-risk factors is allowed on condition that the following guidelines are met:

- For interest rates, banks must have market-risk factors corresponding to interest rates in each currency in which the bank has interest-rate-sensitive, on- or off-balance-sheet positions.
- For exchange rates, market-risk factors that correspond to the individual foreign currencies in which the bank's positions are denominated must be incorporated.
- For equity- and commodity prices, market-risk factors should correspond to each equity- and commodity market in which the bank holds significant positions.

An additional requirement of the IMA is establishing a comprehensive stress-testing program. The bank's stress-testing program should adhere to a qualitative and a quantitative criterion. The quantitative criterion focuses primarily on identifying plausible stress scenarios to which banks could be exposed. In contrast, the qualitative criterion aims to accomplish two important objectives: to evaluate the capacity of a bank's capital to absorb potential large losses and to identify corrective steps to reduce market risk and conserve capital (BIS, 2019f).

The supervisory authorities, furthermore, have the authority to insist on a period of initial monitoring and live-testing of the bank's IMA before this approach may be used for RC purposes (BIS, 2019d; BIS, 2019f; PwC, 2016).

The use of IMA by banks will be subject to explicit approval by the bank's supervisory authority. These supervisory authorities will only approve the use of this approach if the following general criteria are met (BIS, 2019f):

- The bank has a conceptually sound risk management system that was implemented with integrity.
- The bank has a sufficient number of skilled staff with the required competencies to use sophisticated models in trading, risk control, audit and back-office areas.
- The bank uses risk management models with a proven track record in measuring market risks accurately.

- The bank conducts stress tests on a regular basis.

In addition to the general criteria, banks must also adhere to the following qualitative criteria (BIS, 2019f):

- The bank must have an independent risk-control unit responsible for designing and implementing the bank's risk management system.
- The risk-control unit must conduct back-testing on a regular basis.
- The risk-control unit must conduct the initial and ongoing validation of the IMA.
- The board of directors and senior management must be actively involved in the risk-control process and must treat risk control as a critical component in the overall risk management process. A considerable number of resources must be allocated to the risk management process.
- The bank's internal risk measurement model is integrated with its daily risk management processes.
- The risk measurement system is used in conjunction with the bank's internal trading and exposure limits.
- The bank's risk-analysis process is supported by a routine and rigorous stress-testing programme. Stress-testing results are reviewed periodically by senior management and used to assess capital adequacy internally. In addition, senior management and the board of directors must consider the results when setting policies and limits.
- As part of the bank's risk management system, it must have a routine for ensuring compliance with a documented set of internal policies, procedures and controls.
- An independent review of the risk measurement system must be carried out regularly in the bank's internal auditing process.

Finally, the BCBS places significant emphasis on the quality assurance procedures required for the IMA. Quality assurance must be conducted by sufficiently qualified independent parties and must have been done when the model was initially developed and whenever significant amendments are made to the model (BIS, 2019f).

3.4.2.1.6 Operational risk

The Basel III regulatory framework revises the three methods for calculating operational risk and adds a method (the alternative standardised approach).

These four methods are: (1) the basic indicator approach (BIA), (2) the standardised approach (TSA), (3) the alternative standardised approach (ASA), and (4) the advanced measurement approach (AMA). These approaches, which increase progressively in sophistication and risk sensitivity, will now be discussed (BIS, 2019c):

(1) The basic indicator approach (BIA)

A bank utilising the BIA must hold capital for operational risk equal to the average annual gross income (GI) over the previous three years (BIS, 2019c).

Banking institutions are not required to adhere to any specific criteria in order to use this approach. However, they are encouraged to comply with the BCBS's fundamental principles regarding sound operational risk management. These principles were first published in June 2011 and revised in March 2021. The twelve principles are (BIS, 2011b; BIS, 2019c):

Principle 1: The board of directors must take the leadership role in establishing a strong risk management culture.

Principle 2: The bank must develop, implement and maintain an operational risk management framework fully integrated with its overall risk management processes.

Principle 3: The board of directors must establish, approve and periodically review the operational risk management framework and ensure that senior management effectively implements the policies, processes and systems of the operational risk management framework at all decision levels.

Principle 4: The board of directors must approve and review a risk appetite and tolerance statement[24] for operational risk that articulates the nature, types and levels of operational risk the bank is willing to assume.

Principle 5: Senior management must develop (for the approval of the board of directors) a clear, effective and robust governance structure with well-defined, transparent and consistent lines of responsibility.

Principle 6: Senior management must evaluate the identification and assessment of the operational risk inherent in all material products, activities, processes and systems to ensure the inherent risks and incentives are well understood.

Principle 7: Senior management must ensure that the bank's change-management process is both comprehensively and appropriately resourced and adequately articulated between the relevant lines of defence.[25]

Principle 8: Senior management must implement a process to monitor operational risk profiles and material exposures to losses regularly. Appropriate reporting mechanisms that support the proactive management of operational risk must be in place at board-, senior management-, and business-line levels.

Principle 9: The bank must have a strong control environment that utilises policies, processes and systems; appropriate internal controls; and appropriate risk mitigation- and/or transfer strategies.

Principle 10: The bank must implement a robust information and communication technology (ICT)[26] risk management programme in alignment with its operational risk management framework.

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[24] *Risk appetite* is a high-level determination of how much risk an organisation is willing to accept, considering the risk/return attributes; it is often regarded as a forward-looking view of risk acceptance. *Risk tolerance* describes the level of variation a bank is willing to accept regarding business objectives or the level of risk a bank is willing to assume. For the purpose of this study, the terms are used synonymously (BIS, 2011a).

[25] The different lines of defence are dealt with in Chapter 4 (Section 4.4) of the study.

[26] *Information and communication technology* refers to the underlying physical and logical design of information technology and communication systems, the individual hardware and software components, data, and the operating systems (BIS, 2021).

Principle 11: The bank must have business continuity plans to ensure its ability to continue operating and limit losses in the event of a severe business disruption.

Principle 12: The bank's public disclosures must allow stakeholders to assess its approach to operational risk management.

Internationally active banks[27] and banks with significant operational risk exposures are expected to use an approach that is more sophisticated than the BIA (BIS, 2019c).

(2) The standardised approach (TSA)

In the Basel III regulatory framework, TSA divides a bank's activities into the same eight business lines as the BIA and TSA in the Basel II regulatory framework. Within each business line, GI is a broad indicator that serves as a proxy for the scale of business operations and, consequently, the likely scale of operational risk exposure within each of these eight business lines (BIS, 2019c).

The capital requirement for each business line is calculated by multiplying GI by a factor (denoted beta) assigned to that business line. It is important to note that with TSA, the GI is measured for each business line individually and not for the organisation as a whole (BIS, 2019c).

The total capital requirement (K_{TSA}) is calculated as the three-year average of the simple summation of the RC requirements across each business line in each year. It is expressed by the following formula (BIS, 2019c):

Equation 3.1: Total capital requirement

$$K_{TSA} = \frac{\sum_{years\,1-3} \max\left(\sum\left(GI_{1-8} \times \beta_{1-8}\right), 0\right)}{3}$$

Source: BIS (2019c).

[27] An *internationally active bank* is defined as a bank that conducts operations or transactions in foreign markets. The term includes banks that conduct foreign business through establishments abroad, and/or provide services on a cross-border basis (Demirgüçc-Kunt, Evanoff & Kaufman, 2016).

$GI_{1\text{-}8}$ equals annual gross income over the previous three years for each of the eight business lines, and $\beta_{1\text{-}8}$ equals a fixed percentage set by the BCBS (see Table 3.1 in Section 3.3.2.1.3 for the beta factors for each business line).

The general criteria and the additional criteria (only applicable to internationally active banks) to utilise TSA remain unchanged from the general and additional criteria specified in the Basel II regulatory framework (BIS, 2019c; Embrechts & Hofert, 2011; Guttmann, 2011).

It is important to mention that bank supervisors have the right to insist on a period of initial monitoring of a bank's TSA before the bank is permitted to use TSA for RC purposes (BIS, 2019c).

(3) The alternative standardised approach (ASA)

At national supervisory discretion, a bank supervisor can allow a bank to utilise the ASA, provided the bank can satisfy its bank supervisor that this alternative approach provides an improved basis for managing operational risk. Banks that are permitted to implement the ASA will not be allowed to revert to TSA without the permission of their bank supervisors (BIS, 2019c).

In the ASA, the calculation of operational risk capital is similar to TSA, except for two business lines, namely retail banking and commercial banking (BIS, 2019c).

For retail banking, the operational risk capital requirement (K_{RB}) can be calculated by Equation 3.2 below: where β_{RB} is the beta for the retail banking business line, LA_{RB} is the outstanding retail loans and advances averaged over the previous three years, and m is set at 0.035 (BIS, 2019c).

Equation 3.2: Operational risk capital requirement for retail banking

$$K_{RB} = \beta_{\mathrm{RB}} \times m \times LA_{RB}$$

Source: BIS (2019c).

For commercial banking, the operational risk capital requirement (K_{CB}) can be calculated by Equation 3.3 below: where β_{CB} is the beta for the commercial banking business line, LA_{CB} is the outstanding commercial loans and advances averaged over the previous three years, and m is set at 0.035 (BIS, 2019c).

Equation 3.3: Operational risk capital requirement for commercial banking

$$K_{CB} = \beta_{CB} \times m \times LA_{CB}$$

Source: BIS (2019c).

The beta factors (β) for retail- and commercial banking are set at 15%. The total capital requirement is calculated by the summation of the RC requirements across each of the eight business lines (BIS, 2019c).

In the ASA, banks must implement a mapping process for their banking activities. This mapping process necessitates that the eight business lines of a bank are categorised into additional level-two business lines, and specific activity groups are assigned to each of the level-two business lines. This mapping process should be done by senior management, approved by the board of directors, and subject to independent review (BIS, 2019c).

As shown in Table 3.3 below, the BCBS recommends that banks follow a specific mapping process for each business line using the ASA (BIS, 2019c).

Table 3.3: Mapping of business lines under the ASA for operational risk

Level 1	Level 2	Activity groups
Corporate finance	Corporate finance	Mergers and acquisitions, Underwriting, Privatisations, Securitisation,
	Government finance	

Level 1	Level 2	Activity groups
	Merchant banking	Research, Debt, Equity, Syndications, Initial public offerings, Secondary private placements.
	Advisory services	
Trading and sales	Sales	Fixed income, Equity, Foreign exchanges, Commodities, Credit, Funding, Own position securities, Lending and repos, Brokerage, Debt, Prime brokerage.
	Market-making	
	Proprietary positions	
	Treasury	
Retail banking	Retail banking	Retail lending and deposits, Banking services, Trust and estates.
	Private banking	Private lending and deposits, Banking services, Trust and estates, Investment advice.
	Card services	Merchant / commercial / corporate cards, Private labels and retail.

Level 1	Level 2	Activity groups
Commercial banking	Commercial banking	Project finance, Real estate, Export finance, Trade finance, Factoring, Leasing, Lending, Guarantees, Bills of exchange.
Payment and settlement	External clients	Payments and collections, Funds transfer, Clearing and settlement.
Agency services	Custody	Escrow, Depository receipts, Securities lending, Corporate actions.
	Corporate agency	Issuer and paying agents.
Asset management	Discretionary fund management	Pooled, segregated, retail, institutional, closed, open, private equity.
	Non-discretionary fund management	Pooled, segregated, retail, institutional, closed, open.
Retail brokerage	Retail brokerage	Execution and full service.

Source: BIS (2019c).

(4) The advanced measurement approaches (AMA)

The AMA in the Basel III regulatory framework are very similar to the AMA described in the Basel II regulatory framework. Several sections of the AMA, which are important or have been revised by the BCBS, are discussed.

For a bank to be eligible to use the AMA under the Basel III regulatory framework, it must adhere to the same general criteria of TSA (as specified in the Basel II regulatory framework). It must also comply with the qualitative and quantitative criteria as specified in the Basel II regulatory framework (BIS, 2019c).

However, bank supervisors expect banks that utilise this approach to continue to pursue their efforts in developing enhanced risk-sensitive operational risk allocation techniques. With this approach, banks are required to track internal loss data, which is crucial to the development and functioning of a credible operational risk measurement system (BIS, 2019c).

Internally generated operational risk measures used for RC purposes must be based on a minimum five-year observation period of internal loss data and meet six specific standards.[28] When a bank first moves to the AMA, a three-year historical data window is acceptable (BIS, 2019c).

Banks must also have a systematic process for determining when external data must be utilised and the methodologies used to incorporate the external data. The conditions and practices for external data utilisation must be regularly reviewed, documented, and subjected to periodic independent review by bank supervisors. A bank must incorporate scenario analyses[29] of expert opinion in conjunction with external data to evaluate its exposure to high-severity events (BIS, 2019c).

In addition to using loss data, whether actual or scenario-based, a bank's risk assessment methodology must capture key business environment- and internal control factors that can change its operational risk profile (BIS, 2019c).

To qualify for RC purposes, the use of these internal control factors in a bank's risk measurement framework must meet the following standards (BIS, 2019c):

[28] The BCBS requires a bank to meet six specific minimum standards for its internally generated operational risk measures in order to qualify for regulatory capital purposes. These standards fall outside the scope of this study and were, therefore, not included. The standards can be found at: https://www.bis.org/basel_framework/chapter/OPE/30.htm?inforce=20191215&published=20200327

[29] Scenario analysis will be discussed in Section 4.2.6.7 of Chapter 4.

- The choice of each factor needs to be justified as a meaningful driver of operational risk. The choice should be based on previous experience and involve the expert judgement of staff in the affected business areas.
- The sensitivity to changes in a bank's risk estimates of the factors − and the relative weighting of the various factors − need to be well reasoned.
- The framework and supporting rationale for any adjustments to empirical estimates must be documented and subjected to independent review within the bank and by bank supervisors.
- Over time, the process and its outcomes need to be validated by comparison to actual internal loss experience and relevant external data.

3.4.2.1.7 Liquidity standards

Before the adverse events caused by the 2007-2008 GFC, most banks utilised short-term wholesale funding to fund their operations, which posed serious threats to the survival of banks once short-term markets dried up. During the 2007-2008 GFC, the number of liquid assets and central bank funding facilities declined rapidly, and the value of illiquid assets also diminished (Abdel-Baki, 2012; Sadien, 2017). In addition, these adverse consequences of the GFC led to the erosion of the capital levels of banks (Abdel-Baki, 2012; BIS, 2011a; De Cos, 2020; Kasekende, Bagyenda & Brownbridge, 2012; Sadien, 2017).

Systemic risks[30] were not recognised by the previous Basel regulatory frameworks, which required unprecedented intervention and bailouts of systemically important banks by governments and central banks during the 2007-2008 GFC. For this reason, the Basel III regulatory framework includes a liquidity requirement to help manage and mitigate systemic liquidity risks (Abdel-Baki, 2012; BIS, 2011a; BIS, 2019g; BIS, 2019i; De Cos, 2020; Kasekende, *et al.*, 2012; Sadien, 2017).

Following the BCBS's understanding that adequate liquidity is of equal importance as adequate capital levels to achieve financial stability and resilience of the global financial

[30] *Systemic risk* can be defined as the risk of an entire system collapsing. In the context of this study, it involves the risk that the entire financial system may collapse (Valsamakis, Vivian & Du Toit, 2010).

sector, it proposes two standardised quantitative requirements to enhance the liquidity buffers in the banking system: the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) (Abdel-Baki, 2012; BIS, 2011a; BIS, 2019g; BIS, 2019i; De Cos, 2020; Bjarnesjo & Lundberg, 2013; Kasekende *et al.,* 2012; Sadien, 2017).

The LCR is included to promote the short-term resilience of the liquidity risk profile of banks by ensuring that they have adequate high-quality liquid assets (HQLA)[31] to survive a significant stress scenario lasting for a maximum duration of 30 days (Abdel-Baki, 2012; BIS, 2011a; BIS, 2019g).

The LCR comprise two components: (1) the value of HQLA in stressed conditions and (2) total net cash outflows over the next 30 days. The LCR can be calculated by Equation 3.4 below (BIS, 2019g):

Equation 3.4: Liquidity coverage ratio

$$\frac{\text{Stock of HQLA}}{\text{Total net cash outflows over the next 30 days}} \geq 100\%$$

Source: BIS (2019g).

The LCR should be used on an ongoing basis to monitor and control liquidity risk. Banks should report the LCR to their supervisors on a monthly basis, which can be increased to weekly or even daily in the event of stressed conditions. Furthermore, banks are obliged to inform their supervisors immediately if their LCR falls below (or is expected to fall below) 100%. By incorporating these reporting measures, the monitoring and controlling of liquidity risk are significantly improved (Abdel-Baki, 2012; BIS, 2011a; BIS, 2019g; De Cos, 2020; Liste *et al.*, 2012; Sadien, 2017).

The purpose of the NSFR is to ensure that banks maintain a stable funding profile in relation to the composition of their assets and off-balance sheet activities (BIS, 2019h).

[31] The BCBS defines HQLA as assets that can be easily and immediately converted into cash at little or no loss of value (BIS, 2019i).

The NSFR, furthermore, protects a bank from overreliance on short-term wholesale funding and promotes improved assessment of funding risk across all on- and off-balance sheet items to advance funding stability (Abdel-Baki, 2012; BIS, 2011a; BIS, 2019h; Hess & Wanzenried, 2014; Liste *et al.*, 2012; Sadien, 2017).

A sustainable funding structure is intended to reduce the likelihood that disruptions to a bank's traditional sources of funding will result in a decreased liquidity position, thereby increasing the risk of bank failure and systemic stress (BIS, 2019h; Sadien, 2017).

The NSFR is calculated by dividing the amount of available stable funding[32] by the amount of required stable funding[33], where this ratio should be equal to at least 100% on an ongoing basis, as indicated by Equation 3.5 below (BIS, 2019h).

Equation 3.5: Net stable funding ratio

$$\frac{\text{Available amount of stable funding}}{\text{Required amount of stable funding}} \geq 100\%$$

Source: BIS (2019h).

Banks are required to report the NSFR to their supervisors on a quarterly basis (BIS, 2019h).

3.4.2.1.8 The leverage ratio

The leverage ratio is another component included in Pillar 1 of the Basel III regulatory framework. The BCBS defines the leverage ratio as the capital measure divided by the exposure measure, as indicated by Equation 3.6 below (BIS, 2019j).

[32] *Available stable funding* is defined as the portion of capital and liabilities expected to be reliable over the one-year time horizon (BIS, 2019h).
[33] *Required stable funding* is a function of the liquidity characteristics and residual maturities of the various assets held by a bank as well as those of the bank's off-balance sheet exposures (BIS, 2019h).

Equation 3.6: Leverage ratio

$$\text{Leverage ratio} = \frac{\text{Capital measure}}{\text{exposure measure}}$$

Source: BIS (2019j).

The capital measure (the numerator) is the Tier 1 capital of the risk-based capital framework, and the exposure measure (the denominator) is the sum of (1) on-balance sheet exposures, (2) derivative exposures, (3) securities financing transaction exposures and (4) off-balance sheet items. Banks should ensure that the leverage ratio never falls below 3% (BIS, 2011a; BIS, 2019j).

The purpose of this ratio is to prevent the build-up of high levels of leverage that can be harmful not only to individual banks but to the entire financial system (Abdel-Baki, 2012; BIS, 2011a; BIS, 2019j; De Cos, 2020). The BCBS further clarifies that the leverage ratio is a supplementary ratio which will serve as an additional safety measure as it ensures that banks capture on- and off-balance sheet sources of bank leverage adequately (Abdel-Baki, 2012; BIS, 2011a; BIS, 2019j; De Cos, 2020; Bjarnesjo & Lundberg, 2013; Sadien, 2017).

3.4.2.2 Pillar 2: Supervisory review

Pillar 2, the supervisory review process, forms an integral part of the Basel III regulatory framework. The purpose of this pillar is to ensure that banks not only have sufficient capital to support all risks in their businesses but also to develop and utilise better risk management techniques in monitoring and managing these risks (BIS, 2019k; BIS, 2019l).

Pillar 2 requires a bank's management team to accept the responsibility for ensuring that it has adequate capital to support its risks beyond the minimum requirements prescribed in Pillar 1. In addition, Pillar 2 requires that bank supervisors evaluate how well banks assess their capital needs relative to their risks and take appropriate corrective measures when a bank's risk profile changes over time (BIS, 2019k; BIS, 2019l).

The supervisory evaluation process is designed to facilitate an active dialogue between banks and bank supervisors to ensure that, when excessive risks, deficiencies and insufficient capital levels are identified, prompt and decisive actions can be taken to manage these risks, address deficiencies and restore capital to acceptable levels (BIS, 2019k; BIS, 2019l).

It is, however, important to understand that increased capital levels should not be considered the only option for addressing increased risks confronting banks. Other methods for addressing risk, such as improving risk management techniques, applying internal limits, strengthening the level of provisions and reserves, and enhancing internal controls, must also be considered (BIS, 2019k; BIS, 2019l).

Pillar 2 does not include prescriptive guidance or direction on supervisory approaches but is principles-based and intended to be tailored to individual banks' specific needs, circumstances, and risk profiles. Consequently, bank supervisors should use a variety of techniques, methodologies and strategies to carry out their supervisory review process to achieve the overall objectives of a sound supervisory approach (BIS, 2019k; BIS, 2019l).

The BCBS identifies four key principles of supervisory review. These form the foundation on which bank supervisors in different countries base their approaches to the supervisory review process. These four principles are (BIS, 2019k; BIS, 2019l):

- **Principle 1:** Banks must have a process for assessing their overall capital adequacy in relation to their risk profile and a strategy for maintaining their capital levels.
- **Principle 2:** Supervisors must review and evaluate a bank's internal capital adequacy assessments and strategies and their ability to monitor and ensure compliance with RC ratios. Supervisors must take appropriate action if they are not satisfied with the results of this process.
- **Principle 3**: Supervisors must expect banks to operate above the minimum RC ratios and have the authority to require banks to hold capital above the minimum capital requirements.

- **Principle 4**: Supervisors must try to intervene early to prevent capital from falling below the minimum levels required to support the risk characteristics of a particular bank and should require rapid remedial action if capital is not maintained or restored to acceptable levels.

The Basel III regulatory framework highlights three main focus areas under Pillar 2: (1) risks that were not fully captured by the Pillar 1 process; (2) factors not considered by the Pillar 1 process; and (3) factors external to a bank. Particular areas suited to treatment under Pillar 2 are therefore discussed below, which include: (i) risk assessments; (ii) risk appetite; (iii) stress-testing practices; (iv) interest rate risk in the banking book (IRRBB); (v) business model risk; (vi) concentration risk; (vii) counterparty credit risk and securitisation; and (viii) other risk areas.

i. Risk assessments

In bank supervision, a range of practices concerning the assessment of risks is adopted, which focus primarily on reviewing banks' internal processes rather than establishing prescriptive requirements to be met (BIS, 2019k, BIS, 2019l).

All bank supervisors are required to review the strategies, processes and mechanisms implemented by banks in relation to their particular risk profiles and associated internal capital resources. These reviews are usually based on an assessment of a bank's business model, its internal governance- and risk management frameworks, and an assessment of the risks to capital. Most bank supervisors assess capital risks on an ongoing basis. They also conduct periodic comprehensive reviews of a bank's capital positions through a review of its internal capital adequacy assessment process (ICAAP)[34] and stress-testing results (BIS, 2019k; BIS, 2019l; Farid, 2010).

The ongoing risk assessment is usually supported by regular off-site or on-site analyses, financial reporting, qualitative information, audit reports and meetings with a bank's management team (BIS, 2019k; BIS, 2019l).

[34] ICAAP comprise internal procedures and systems that ensure that a bank will have sufficient capital resources to cover all its material risks in the long term (Farid, 2010).

ii. Risk appetite

Most bank supervisors do not provide banks with detailed requirements to develop their risk appetite. This is partly to ensure that banks understand the risks they face and also to ensure that banks fully accept the responsibility for managing and mitigating their risks (BIS, 2019k; BIS, 2019l).

The bank supervisors, however, require the risk appetite framework of banks to be integrated into their decision-making processes and risk management procedures and aligned with their business plans, strategies, capital planning and remuneration practices (BIS, 2019k; BIS, 2019l).

iii. Stress-testing practices

Stress testing forms an important element of a bank's risk management protocol and is a core tool for banking supervisors and macroprudential authorities. Stress testing alerts a bank's management team and supervisory authorities to unexpected adverse outcomes related to various risks and indicates which financial resources might be needed to absorb losses should large shocks occur (BIS, 2019k; BIS, 2019l; Westwood & Segoviano, 2016; Van Dyk, 2012).

iv. Interest rate risk in the banking book (IRRBB)

IRRBB[35] is a critical risk that arises from banking activities. Therefore, banks must identify the IRRBB inherent in their products and activities to ensure that these risks are subject to adequate risk-control procedures (BIS, 2019k; BIS, 2019l).

The management of IRRBB should be integrated into banks' broader risk management frameworks and aligned with their business planning and budgeting activities. Therefore, banks must develop and implement an effective stress-testing framework for IRRBB as part of their broader risk management processes. These stress-testing frameworks

[35] IRRBB refers to a bank's current or prospective risk to its capital and to its earnings, arising from the impact of adverse movements in interest rates on its banking book. IRRBB arises because interest rates can vary significantly over time, while the business of banking typically involves intermediation activity that produces exposures to both maturity mismatch and rate mismatch (BIS, 2019k; BIS, 2019l).

should be incorporated into the decision-making processes (this includes strategic decision-making) at banks' management levels (BIS, 2019k; BIS, 2019l).

IRRBB stress testing should be considered in banks' ICAAPs, which require them to undertake precise, forward-looking stress-testing approaches to identify potential events that could have a severe negative impact on their capital and/or earnings potential (BIS, 2019k; BIS, 2019l).

v. Business model risk

Due to the dynamic and volatile market- and business environments, bank supervisors do not assess capital adequacy at a single point in time, but rather assess each bank's business model and the stability levels of its profits to ensure that its operations are safe and sustainable. Bank supervisors, therefore, conduct business analyses separate from their supervisory review processes (BIS, 2019k; BIS, 2019l).

vi. Concentration risk

All bank supervisors expect banks to consider the impact of concentration risk[36] and have, therefore, developed methodologies for assessing such risks (BIS, 2019k; BIS, 2019l).

vii. Counterparty credit risk and securitisation

Important aspects of credit risk, not fully captured under Pillar 1 of the Basel III regulatory framework, are included in Pillar 2; namely counterparty credit risk (CCR)[37] and securitisation[38] (BIS, 2019k; BIS, 2019l; BIS, 2019m).

- Counterparty credit risk

Banks are required to have CCR management policies, processes and systems in place that are conceptually sound and implemented with integrity in accordance with the sophistication and complexity of their CCR exposures. Banks are also required to refuse

[36] *Concentration risk* is any single exposure, or group of exposures, with the potential to produce losses large enough to threaten a bank's financial health and ability to maintain its core operations. Because lending is the primary activity of most banks, credit risk concentrations are often the most material risk concentrations within a bank (BIS, 2019l).
[37] *Counterparty credit risk* is the risk that arises when the counterparty to a transaction could default on the final settlement of the transaction's cash flow (BIS, 2019m).
[38] Refer to Section 2.7.9 for a detailed explanation of securitisation.

to undertake business with a counterparty without assessing its creditworthiness and taking due account of settlement and pre-settlement credit risks (BIS, 2019k; BIS, 2019l; BIS, 2019m).

- Securitisation

Considering the wide range of risks associated with securitisation activities, which are compounded by rapid innovation in securitisation techniques and instruments, minimum capital requirements calculated under Pillar 1 are often insufficient (BIS, 2019k; BIS, 2019l).

All risks arising from securitisation, particularly those not fully captured in Pillar 1, should be addressed in banks' ICAAPs. These risks include: (1) credit-, market-, liquidity-, and reputational risks; (2) potential misconduct and losses on the underlying securitised exposures; (3) exposures from credit lines or liquidity facilities to special-purpose entities; and (4) exposures from guarantees provided by third parties (BIS, 2019k; BIS, 2019l).

As a minimum requirement, bank supervisors should ensure that banks allocate adequate funds to cover the economic substance of securitisation risk (BIS, 2019k; BIS, 2019l).

viii. Other risks

In the Basel III regulatory framework, bank supervisors should require banks to manage all risks: traditional financial risks (credit-, market- and interest rate risks) and reputational, legal- and strategic risks. Banks must consider risks that may not appear to be significant when analysed in isolation but could lead to material losses when combined with other risks (BIS, 2019k; BIS, 2019l).

3.4.2.3 Pillar 3: Market discipline

Pillar 3 of the Basel III regulatory framework aims at promoting market discipline through regulatory disclosure requirements. These disclosure requirements enable market participants to access relevant information about banks' RC and risk exposures. This information enhances the transparency and confidence in the risk profiles and overall adequacy of banks' RC (BIS, 2019n; BIS, 2019o; Ferreira, Jenkinson & Wilson, 2019).

The disclosure of important information reduces information asymmetry and aids in promoting the comparability of banks' individual risk profiles within countries (BIS, 2019n; BIS, 2019o; Ferreira *et al.,* 2019).

The BCBS agreed on five guiding principles for the revised disclosure requirements of Pillar 3 that draw on the lessons learned from the 2007-2008 GFC. These principles aim to provide a firm foundation to achieve transparent, high-quality Pillar 3 risk disclosures that will enable relevant stakeholders to better understand and compare the operations and risks of different banks (BIS, 2019n; BIS, 2019o). These five principles are (BIS, 2019n; BIS, 2019o):

- **Principle 1- Clarity:** The disclosures must be presented in a form that will be readily understood by stakeholders, communicated through an accessible medium, and be easy to access.
- **Principle 2- Comprehensiveness:** The disclosures must describe banks' principal activities, all significant risks, changes in risk exposures between reporting periods, and management responses.
- **Principle 3- Meaningfulness:** The disclosures must highlight current and emerging risks as well as how these risks are appropriately managed. References to items in the statement of financial position and statement of comprehensive income must also be included.
- **Principle 4- Consistency over time:** The disclosures must enable stakeholders to identify and understand different banks' operations, risk profiles, and management procedures. Any significant changes must be highlighted and explained.
- **Principle 5- Comparability:** Comparable disclosures among banks are critical to allow stakeholders to assess the relative performance of different banks and to compare prudential metrics, risks, and risk management procedures across banks.

The information provided by banks under Pillar 3 must be subject, at a minimum, to the same level of internal review and internal control procedures as the information provided by banks for their financial reporting purposes. Banks' Pillar 3 reports must also be

published concurrently with their financial reports for the corresponding period (BIS, 2019n; BIS, 2019o).

Sections 3.5 and 3.6 discuss both the criticisms and positive aspects of implementing the Basel III regulatory framework.

3.5 Criticisms of the Basel III regulatory framework

The criticisms of the Basel III regulatory framework are categorised under the following subheadings: Profitability, Complexity, Operational efficiency, Capital adequacy requirements, Economic growth, and African banking perspective.

3.5.1 Profitability

A major drawback of the Basel III regulatory framework is that the minimum capital requirements for banks are significantly higher than in the Basel II regulatory framework − which could negatively affect a bank's profitability and ROE.[39] Banks should aim to keep their ROE as high as possible, but this objective can be a very challenging task owing to the increased equity requirements stipulated by the framework (Cronje & Van Rooyen, 2013; Kowalik, 2011).

Shareholders often fear a bank will experience liquidity problems when common equity is offered to the general public. Issuing more equity does not appeal to investors because the earnings per share will decrease. Alternatively, banks could attempt to maintain their ROE by raising profits. With the need to increase profitability, banks will be forced to transfer their funds to riskier parts of the economy and, as a result, will be required to hold higher levels of capital. This approach, once again, places significant strain on the resilience and stability of banks and neutralises the safety created through the increased capital requirements, defeating the initial objectives of the Basel III regulatory framework (Barfield, 2014; Cronje & Van Rooyen, 2013; Kowalik, 2011).

[39] The return on equity (ROE) measures a bank's profitability in relation to shareholders' equity. The ROE is calculated by dividing earnings after tax by shareholders' equity (Marx, De Swardt, Pretorius & Rosslyn-Smith, 2017).

3.5.2 Complexity

The Basel III regulatory framework is very complex in terms of data, analytics, implementation and reporting. The increased complexity will raise not only the cost of compliance but also the cost of enforcement by regulatory authorities. Complexity will also force bank examiners to make more judgement calls, which poses additional risks for banks and the greater economy (Fratianni & Pattison, 2015; Schmaltz, Pokutta, Heidom & Andrae, 2014; Ozili, 2019).

3.5.3 Operational efficiency

Chiaramonte and Casu (2017) argued that the higher capital requirements prescribed by the Basel III regulatory framework might harm the operational efficiency of banking institutions. Berger and Di Patti (2006) investigated the effect of bank regulations on profitability and efficiency and found that lower capital ratios increased banks' operating efficiency. Their research suggests a negative relationship exists between higher capital regulatory requirements and bank efficiency. Obadire, Moyo and Munzhelele (2022) argued that the higher capital requirements of the Basel III regulatory framework could leave banks operating in African countries with very limited capital to explore additional investment opportunities and could, therefore, hinder their profitability and impair their operational efficiency.

3.5.4 Capital adequacy requirements

Kasekende *et al.* (2012) contended that the Basel III regulatory framework placed too much emphasis on capital adequacy requirements as a regulatory tool to ensure the resilience of banks. Calomiris (2013) argued that forcing banks to raise their equity-to-asset ratios would reduce their willingness to lend, which is counterproductive for economic growth. The capital adequacy requirements are essential, but in banking systems where asset values are very volatile, the capital requirements cannot realistically shoulder the entire burden of prudential regulation. Instead, it is necessary to regulate the asset side of a bank's statement of financial position in order to control excessive risk-taking and improve the quality and accurate valuation of bank assets and the associated provisioning for losses (Bjarnesjo & Lundberg, 2013; Kasekende *et al.*, 2012).

3.5.5 Economic growth

The Institute of International Finance (IIF)40 argued in 2011 that implementing the Basel III regulatory framework would have a detrimental impact on the economic growth of countries, particularly those in the Euro Zone. At the time, it was forecast that the earnings of the European banking industry would decrease by approximately six per cent once the Basel III regulatory framework was fully implemented (IIF, 2011; Mehta, Neukirchen, Pfetsch & Poppensieker, 2012).

3.5.6 African banking perspective

A study by Abdel-Baki (2012) emphasised that the costly measures required by the Basel III regulatory framework might prevent emerging and developing economies from deepening and developing their financial sectors. Taylor (2010) also raised a significant concern: whether the more demanding requirements specified by the Basel III regulatory framework would place additional pressure on developing economies owing to the increased costs, a concern particularly relevant to banks in Africa.

For banks operating in African countries, the main drawbacks still relate to the over-emphasis on capital requirements as a regulatory tool and the lack of attention to other regulations, which can complement the capital requirements and strengthen the resilience of banks situated in Africa (Kasekende *et al.,* 2012; Nyantakyi & Sy, 2015).

The higher capital requirements of the Basel III regulatory framework will significantly reduce the ability of banks operating in African countries to provide credit to small and medium enterprises (SMEs). This limitation could harm economic growth, as SMEs are critical to sustainable growth and economic development in African countries (Fjose, Grunfeld & Green, 2010; Ozili, 2019, Jones & Knaack, 2019).

Political interference in banking regulation and supervision in African countries is another challenge. Politicians often take legislative actions to prevent a central bank from implementing specific regulations that they feel will jeopardise weaker local banks or might negatively affect the banks to which they (the politicians) are commercially affiliated

[40] The IIF consists of over 400 large global banks, insurance companies and investment firms. It provides an informal forum of connecting policymakers, regulators and financial institutions (IIF, 2011).

(Ozili, 2019). The bank regulators in African countries are often selective adopters of the Basel requirements. It is difficult to minimise and eliminate this selective adoption problem since most African countries are not members of the BCBS and are, therefore, not under any obligation to adopt all the requirements stipulated by the Basel III regulatory framework. This may limit the framework's effectiveness in Africa (Ozili, 2019).

A crucial challenge arises from human resource constraints and the increased information asymmetry between bank supervisors and the banks themselves. The complexity of the Basel III requirements exacerbates information asymmetries between the bank regulators and the banks themselves and creates additional opportunities for regulatory arbitrage (Jones & Knaack, 2019). With specific reference to Ghana, Adjirackor, Asare, Asare, Gagakuma and Kpawul (2017) pointed out that a major challenge for banks operating in Ghana is the shortage of human resources to interpret and implement the requirements of the Basel frameworks correctly and effectively.

3.6 Positive aspects of the Basel III regulatory framework

Considering the propositions of the renowned Modigliani-Miller theory[41] on capital structure, academics and banking experts assert that the Basel III regulatory framework's higher capital requirements will reduce banks' leverage, lowering the probability of a systematic banking crisis. The stricter capital- and liquidity requirements aim to safeguard the global financial system from experiencing another GFC and to contain the severity of such an unfortunate event within manageable limits. This contributes substantially to promoting financial stability and resilience of the global financial system (Allen, Chan, Milne & Thomas, 2012; Chouinard & Paulin, 2014; Danielsson, 2015; Miles, Yang & Marcheggiano, 2012; Modigliani & Miller, 1958).

The conservation- and countercyclical buffers increase the amount of capital banks are required to hold in an economic boom, resulting in the build-up of secondary capital reserves that banks can utilise to absorb potential losses during an economic downturn.

[41] The Modigliani-Miller theorem, first published in 1958, is one of the most important theorems in corporate finance. The theorem was developed by economists Franco Modigliani and Merton Miller. The main idea of the Modigliani-Miller theory is that the capital structure of an organisation does not affect its overall value (Modigliani & Miller, 1958; Luigi & Sorin, 2009).

The leverage ratio is included to serve as another safety measure to prevent the deleveraging of banks during a GFC. The simplicity of the leverage ratio is an added advantage, which makes it accessible to all banks as it has no significant cost implications and does not require particular expertise from banks and their respective supervisors (D' Hulster, 2009; Hagendorff & Vallascas, 2013; Kowalik, 2011; Lyons & Casey, 2011; Ojo, 2011).

Overall, the more stringent requirements prescribed by the Basel III regulatory framework enhance the quality of capital and banks' funding structures. It can, therefore, be concluded that if banks are able to acquire the necessary resources and capabilities and implement the Basel III requirements, their ability to withstand external shocks will be increased; which will ultimately contribute to improving the financial stability and resilience of the global financial system (Giordana & Schumacher, 2017; Krug, Lengnick & Wohltmann, 2015; Šútorová & Teplý, 2014; Taskinsoy, 2013; Sadien, 2017).

3.7 Conclusion

Based on the literature study conducted on the Basel I-, Basel II- and Basel III regulatory frameworks, the following conclusions can be drawn:

The Basel I regulatory framework displayed both strengths and weaknesses. It succeeded in establishing a framework for capital regulation for internationally active banks and achieved the following objectives:

- It provided a clear definition of RC.
- It enabled the measurement of RWA, which included the measurement of off-balance-sheet exposures.
- It provided minimum metrics for RC to RWA.

However, the management of credit risk was the predominant focus of the Basel I regulatory framework. Consequently, the framework did not provide for managing other important risk categories, such as market risk and operational risk – which both required urgent attention to assist the banking sector. Therefore, the Basel I regulatory framework can be acknowledged for its unquestionable contribution towards establishing a safer and

less volatile banking environment and safeguarding banks from experiencing capital and liquidity problems. However, further improvements to the framework were required (Brownbridge, 2014; Girling, 2014).

In developing the Basel II regulatory framework, the BCBS wanted to reconcile several seemingly irreconcilable objectives. Initially, the objectives appeared to be positive and innovative, but the difficulties were obvious when it came to implementation (Brownbridge, 2014).

The Basel II regulatory framework aimed to increase the safety and soundness of the global banking system without changing the overall level of capital in the system. The framework recognised the responsibilities of host country supervisors without raising compliance costs and increased the risk sensitivity of capital requirements without aggravating the procyclicality of lending (Balin, 2008; Griffith-Jones, Segoviano & Spratt, 2003; Herring, 2005).

Academics and banking experts have acknowledged that a substantial benefit of the Basel II regulatory framework was improving the safety and soundness of the global banking system through improved risk management practices. However, it is questionable whether these improvements were realistic for all banking systems, especially those in developing countries, owing to increased complexity and high compliance costs (Alexander, 2004; Carvalho, 2005; Herring, 2005; Mostert, 2013).

The Basel II regulatory framework was very costly for banks, home country, and host country supervisors because it aggravated macroeconomic cycles in the broader economy. Much of the cost was derived from the elaborate and highly prescriptive approach to specifying the risk weights for capital charges (Balin, 2008; Herring, 2005; Llewellyn & Meyers, 2005).

Despite the criticisms, the Basel II regulatory framework has extended the breadth and precision of the Basel I regulatory framework by including the measurement of market risk and operational risk and incorporating factors such as market-based discipline and surveillance and regulatory mandates. The innovations of the Basel II regulatory framework further focused on implementing more sophisticated methodologies for

computing the value of a bank's RWA. It provided additional options for determining the minimum capital requirements for banks, ranging from simple to more complex methodologies in order to calibrate the minimum capital requirements more closely to the risks encountered by banks (Balin, 2008; Brownbridge, 2014; Griffith-Jones *et al.*, 2003; Goodhart, 2011; Herring, 2005).

However, whether the potential gains to improve financial stability were worth the additional costs are questionable. The Basel II regulatory framework increased the complexity of capital regulation and the cost of compliance, which represented a significant challenge for banks operating in developing economies (Balin, 2008; Griffith-Jones *et al.*, 2003; Jones, 2000; Herring, 2005).

The Basel III regulatory framework addressed the quality, consistency, and transparency of a bank's capital base; introduced regulatory adjustments to Tier 1 capital; increased risk coverage requirements; and enhanced the transparency of risk management practices to all relevant stakeholders. Similar to the previous two regulatory frameworks, the capital ratios of the Basel III regulatory framework were calculated as a percentage of RWA. In addition to the capital requirements, revisions were introduced to manage credit-, market- and operational risk. The Basel III regulatory framework included liquidity standards to help manage and mitigate systemic liquidity risks and introduced a leverage ratio to prevent the build-up of high levels of leverage that could be harmful to individual banks as well as financial systems (Abdel-Baki, 2012; BIS, 2019g; BIS, 2019i; BIS, 2019j; Brownbridge, 2015; Sadien, 2017).

Under the Basel III regulatory framework, individual banks were to maintain higher and better-quality liquid assets and improve their liquidity risk management. The new liquidity rules were expected to affect banks significantly as these rules would lead to more capital- and liquidity-efficient business models and products (BIS, 2019g; BIS, 2019i; Dietrich *et al.*, 2014; Härle *et al.*, 2010; Nyantakyi & Sy, 2015).

Significant improvements were also made to Pillar 2 and Pillar 3 of the regulatory framework. In Pillar 2, specific attention was devoted to:

- risk considered in Pillar 1 that were not fully captured by the Pillar 1 process,

- factors not considered by the Pillar 1 process, and
- factors external to banks.

The BCBS paid additional attention to risk assessments, risk appetite, stress-testing practices, IRRBB, business model risk, concentration risk, CCR and securitisation, and other risk areas in banks. In Pillar 3, the revised disclosure requirements were formulated to enable relevant stakeholders to understand and compare bank operations more transparently (BIS, 2019k; BIS, 2019l).

However, complying with the enhanced requirements of the Basel III regulatory framework could harm a bank's performance because it could lead to a decrease in profitability and a tightening of lending margins (Cronje & Van Rooyen, 2013; Dietrich *et al.,* 2017; Macroeconomic Assessment Group, 2010).

Since the Basel III regulatory framework involved a significant degree of complexity and ambiguity, the cost of complying with the requirements was extremely high. These cost implications posed significant problems for banks in developing economies, specifically for banks operating in African countries (Cronje & Van Rooyen, 2013; Frait & Tomsik, 2014; Kasekende *et al.,* 2012; Nyantakyi & Sy, 2015).

The Basel III regulatory framework was initially designed for large international banks operating in BCBS member jurisdictions (BIS, 2004; BIS, 2011a; Ferreira, Jenkinson & Wilson, 2019). For this reason, there were concerns that banks might misinterpret these requirements, as only a limited number of banking experts would have the necessary expertise and experience to implement them correctly. This was and still is a challenge for banks in developing economies and specifically for banks operating in African countries, with limited access to specialised skills, experience and technology. A need for additional training interventions is, therefore, an essential requirement in order to implement the requirements of the Basel III regulatory framework correctly and efficiently (BIS, 2014f; Bjarnesjo & Lundberg, 2013; Nyantakyi & Sy, 2015; Taylor, 2010)

Despite the significant challenges, the Basel III regulatory framework is a definite leap towards a more resilient banking system: promoting financial stability and enhancing the sustainability of the global financial system. Indeed, several corrective measures are

required, but if these challenges can be overcome and the necessary improvements are made, the Basel III regulatory framework can be of significant value for banks in both developed and developing economies in the quest to create a more resilient global banking system (Cronje & Van Rooyen, 2013; Fratianni & Pattison, 2015; Kowalik, 2011; Nyantakyi & Sy, 2015).

This chapter provided information on the different pillars of the Basel I-, Basel II- and Basel III regulatory frameworks. The purpose was to identify important changes and modifications as the regulatory frameworks evolved. This provided a better understanding of the composition of these three regulatory frameworks and the reasons behind the modifications. Both the positive and negative aspects of each regulatory framework were discussed in order to assist in the formulation of appropriate guidelines to Ghanaian banks on the management and governance of operational risk

The next chapter will elaborate on the importance of operational risk and the management thereof. The significance of risk culture and risk governance in providing the infrastructure to manage operational risk effectively will also receive attention (Power, Ashby & Palermo, 2013; Neifar & Jarboui, 2018).

Chapter 4 - Operational risk, risk culture and the governance of risk

4.1 Introduction

A one-size-fits-all solution for financial institutions will not be successful in operational risk management. Therefore, recommendations on the management of operational risk provided to banks should be specifically designed to fit each bank's size, complexity, risk profile and the guidelines and regulations provided by the bank regulator. Managing a high number of internal and external risks remains one of the most significant challenges for banks. The continued increase in banking clients and transaction volumes, the globalisation of the economy, the increased reliance on technology and the volatility of global markets have introduced greater complexity and uncertainty to banks (Alogab, Alobaidi & Raweh, 2018; International Finance Corporation (IFC), 2015; Jackson, 2015). These challenges highlight the increasing importance for banks to improve their operational risk management processes and procedures to identify, evaluate, control, and finance operational risks (Young, 2022).

The 2007-2008 GFC emphasised that banking institutions should re-evaluate their risk management processes and procedures and take corrective measures to improve their risk management practices. Such measures are crucial for managing operational risks, which requires a robust risk culture and governance structure that promotes and supports the effective management of operational risks (Evans & Selim, 2015; IFC, 2015; Hess, 2011; Schwartz-Gârliste, 2013).

For banks to remain competitive and achieve a competitive advantage while also increasing their overall performance, they must find improved methods to understand and proactively manage risks, rather than dealing with the adverse consequences in a reactive manner. In this regard, it is imperative to understand the relationship between operational risk management, risk culture and operational risk governance from a banking perspective (Evans & Selim, 2015; IFC, 2015; IRM, 2012c).

The purpose of this chapter is to address secondary research objectives nine to eleven, namely,

- To obtain a comprehensive perspective and understanding of operational risk and the management thereof in a banking context (SO_9).
- To examine the importance of risk culture and risk governance in banks (SO_{10}).
- To investigate the interdependence and interconnectedness of banks' risk culture- and risk governance practices to promote the effective management of operational risk in banking institutions (SO_{11}).

These aspects of operational risk management have been specifically selected for further discussion in this chapter as they are relevant to the study's research objectives and will aid in understanding the significance of the study.

4.2 Operational risk

In this section, the following aspects regarding operational risk management in banks will be discussed:

- The definition of operational risk.
- Operational risk factors
- The classification of operational risk events.
- The management of operational risk in the banking sector
- The monitoring and reporting of operational risk
- The disclosure of operational risk.
- Operational risk mitigation
- Operational risk management tools.

4.2.1 Operational risk defined

Operational risk used to be a generic term that covered a broad spectrum of risks not covered by financial risks (such as credit-, market- and liquidity risks) (Young, 2022). However, the increased importance of managing operational risk effectively, specifically after the publication of the Basel I regulatory framework, requires a more precise and

clear definition of operational risk (Cruz, Peters & Shevchenko, 2015; Young, 2022). Various definitions have been formulated for operational risk, of which the following are examples:

Schwartz and Smith (1997) defined operational risk as the risk of loss arising from human error, management failure and fraud, or shortcomings in systems or controls.

Hoffman (1998) stated that the universe of operational risk included, but is broader than, operations or processing risk. Operational risk transcended all business lines of organisations and spanned front-, middle- and back-office business operations.

Davies, Fairless, Libart, Love, O'Brien, Slater and Shepheard-Washington (1998) defined operational risk as the risk that may result from deficiencies in information systems or internal controls and may lead to unexpected losses. In their definition, risk was associated with human error, system failures and inadequate procedures and controls.

Young (2022) defined operational risk as an organisation's exposure to potential losses resulting from shortcomings and/or failures in the execution of its operations and caused by the primary risk factors, namely people, systems, processes and external factors.

Jarrow (2008) stated that there were two types of operational risk: the risk of a loss due to the organisation's operating technology or the risk of a loss due to agency costs.

The Bank of Japan pointed out that operational risk within banks did not necessarily inflict a direct loss on banks themselves but that financial institutions could suffer indirectly through a loss of reputation when third parties incurred direct losses. This additional risk makes correct identification and definition of operational risk critical (Alogab *et al.*, 2018; Zhou, Qi, Xiao & Wang, 2021).

However, Savic (in Knežević, 2013), argued that from a banking perspective, the definition of operational risk should include moral hazards, which specifically occurred due to information asymmetries between the lenders and borrowers of funds. These moral hazards lowered the possibility of loan repayments, which posed a significant risk to banks, as evidenced by the large number of bank failures that occurred during and after the 2007-2008 GFC (Pakhchanyan, 2016).

Considering the definitions mentioned above, scholars and bank regulators generally agree with the definition provided by the BCBS when they defined operational risk as: "*The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events"* (BIS 2020: 2). This definition includes legal risk but excludes strategic and reputational risk (De Cos, 2020; De Jongh, De Jongh, De Jongh & Van Vuuren, 2013; Martins, 2010; Young, 2014).

Since the BCBS's definition of operational risk has gained widespread acceptance by institutions, scholars and bank regulators, it was selected as the most appropriate for this study. This definition focuses primarily on operational risk management from a banking perspective and complies with the Basel III regulatory framework's operational risk management requirements.

From the BCBS's definition of operational risk, it is evident that it comprises four risk factors: processes, people, systems and external events (De Cos, 2020; Young, 2022). It is necessary to have a thorough understanding of these four operational risk factors for the effective management and control of operational risk (BIS, 2002c; BIS, 2010).

The four operational risk factors are discussed below.

4.2.2 Operational risk factors

- **Processes:** Processes form an integral part of operational risk. Banks execute many processes to deliver their services. In general, process risk could result in processing failures. There is also the risk of inadequate processes, which can cause unexpected losses (Young, 2022).
- **People:** Some operational risk failures are driven explicitly by factors attributable to the behaviour of bank personnel. People risk arises from the possibility of incompetent, inexperienced, unsuitable and/or negligent staff (Young, 2022).
- **Systems:** Banking institutions face the risk that their systems, specifically ICT, are not proficiently designed and implemented or capable of optimally supporting their business operations. Banks can suffer significant losses due to system failures that hinder their service delivery (Young, 2022).

- **External events:** The external environment in which banks operate can give rise to operational risk. External events are beyond the direct control and influence of banks and could have a negative effect on the internal operational risk factors (people, processes and systems) of a bank (Young, 2022).

The four operational risk factors can be categorised into various operational risk event types that are the main causes of operational losses[42] for banks, as shown in Table 4.1 (Young, 2022).

Table 4.1: Categorisation of operational risk event types

Operational risk factors	Operational risk event types
Processes	• Employment practices and workplace safety • Clients, products and business practices • Execution, delivery and process management
People	• Clients, products and business practices • Internal fraud • Rogue trading • Principal-agent risk • Execution, delivery and process management
Systems	• Business disruption and system failure
External events	• External fraud • Business disruption and system failure • Damage to tangible assets

Source: Adapted from Young (2022).

The various operational risk event types are further discussed in Section 4.2.3.

[42] Operational losses are defined as losses resulting from inadequate or failed internal processes, people and systems, or from external events (BIS, 2011b).

4.2.3 The classification of operational risk events

The BCBS identifies the following operational risk event types as having the ability to cause significant losses for banks: (1) internal fraud, (2) external fraud, (3) clients, products and business practices, (4) employment practices and workplace safety, (5) business disruption and system failures, (6) damage to tangible assets, (7) execution, delivery and process management (BIS, 2002c; BIS, 2010).

This section will briefly elaborate on these different operational risk event types.

4.2.3.1 Internal fraud

Internal fraud can be defined as unauthorised activities or theft, credit fraud, worthless deposits, robbery, extortion, embezzlement, misappropriation of assets, forgery, smuggling, account ownership, tax evasion, bribes, and insider trading. From a banking perspective, two types of internal fraud schemes are particularly significant in operational risk management: rogue trading and principle-agent risk (BIS, 2020; Pereira & Silva, 2018). These two types of internal fraud schemes will be briefly described.

4.2.3.1.1 Rogue trading

Rogue trading typically occurs in investment banking and is defined as a fraudulent act where a bank employee acts recklessly and independently of fellow employees, usually to the detriment of the client and the bank. Rogue traders typically trade in high-risk investment opportunities, which cause significant losses to banks and their clients, although these losses are preceded by large but unsustainable profits (BIS, 2002c; BIS, 2010; De Cos, 2020; Pereira & Silva, 2018).

4.2.3.1.2 Principal-agent risk

Principal-agent risk arises when agents who act on behalf of a bank pursue actions or objectives that are not in the best interest of the bank and its stakeholders but rather in their own interest. Many of the heavy financial losses experienced by banks during and after the 2007-2008 GFC were initiated by principal-agent risk. Consequently, banks should carefully identify and monitor this type of risk (BIS, 2002c; BIS, 2010; De Cos, 2020; Pereira & Silva, 2018).

4.2.3.2 External fraud

External fraud is defined as losses due to actions to defraud, misappropriate property, or actions that involve a third party (external to a bank) to bypass the law. These acts include theft, forgery, the rollover of cheques, information theft and hacking. External fraud may be committed in collusion with bank employees; therefore, internal and external fraud may coexist in some instances. However, in most cases, external fraud involves actions independently carried out by third parties outside a bank (BIS, 2002c; BIS, 2010; De Cos, 2020).

4.2.3.3 Employment practices and workplace safety

Employment practices and workplace safety refer to losses in banks because of acts inconsistent with employment practices, the law or collective bargaining agreements. These include health and safety risks and the payment for personal injury or discrimination imposed on individuals (BIS, 2002c; BIS, 2010; De Cos, 2020).

4.2.3.4 Clients, products and business practices

This type of operational risk refers to losses incurred due to an unintentional or negligent breach of a professional obligation relating to specific clients of a bank or their products. It covers inappropriate business practices; improper market practices; the manipulation of the market; unlicensed activities; money laundering; and product failure, which include defects or errors in the product and excessive exposure of the client's credit limits and risk appetite (BIS, 2002c; BIS, 2010; De Cos, 2020; Pereira & Silva, 2018).

4.2.3.5 Business disruption and system failure

Business disruption and system failure refer to losses resulting from a disruption in a bank's operations or a malfunction in systems of hardware, software, telecommunication networks and service interruptions. Information technology (IT) systems are utilised in banks to increase efficiency, simplify operations and increase the speed at which data flows within banks. When these IT systems fail, they can negatively impact banks' performance (BIS, 2002c; BIS, 2010; De Cos, 2020; Lang, 2020; Pereira & Silva, 2018).

4.2.3.6 Damage to tangible assets

Damage to tangible assets in banks includes losses resulting from natural disasters or human-derived activities, including vandalism and terrorist attacks (BIS, 2002c; BIS, 2010; De Cos, 2020; Berkowitz, Hoekstra & Schoors, 2012).

4.2.3.7 Execution, delivery and process management

Execution, delivery and process management are defined as bank losses because of failed process management, incorrect transaction processing or unsuccessful relations with trade counterparties and vendors. This operational risk type, therefore, includes errors in the capturing of transaction information, which relate to incorrect customer registrations and errors in the entry, loading and maintenance of data, as well as errors in the outsourcing of services and disagreements with vendors and suppliers (BIS, 2002c; BIS, 2010; De Cos, 2020; Pereira & Silva, 2018).

Bearing the classification of operational risk events in mind, Section 4.2.4 will elaborate on operational risk management in the banking sector.

4.2.4 The management of operational risk in the banking sector

Successful operational risk management is a critical element of banks' risk management protocol, as all the banking products, activities, processes and systems contain operational risks. Sound operational risk management reflects the effectiveness of a bank's board of directors and senior management in executing their risk management responsibilities (De Cos, 2020; BIS, 2011c; Girling, 2013).

Because operational risk management is dynamic in nature and the banking environment is constantly changing, senior management is tasked with ensuring that all operational losses are adequately addressed in a timely and efficient manner. Improvements in the management of operational risks depend heavily on senior management's willingness to be proactive and to act promptly and appropriately to address operational risks as they emerge within different business units of a bank (Alogab *et al.*, 2018; De Cos, 2020; BIS, 2011c; Martin, 2010). The board of directors and senior management should understand the nature and complexity of the risks inherent in the portfolio of a bank's products,

services, activities and systems − which is a fundamental premise of sound risk management. This premise is particularly important for operational risk, given that operational risks are inherent in all business products, activities, processes and systems (BIS, 2012; Alogab *et al.*, 2018; De Cos, 2020).

Furthermore, operational risk management must be conducted proactively rather than attempting to measure the operational loss events after these losses have occurred. This approach has been found to reduce banks' profit and loss volatility. Operational risks are determined by a multitude of factors, including the complexity of a bank's structure, the complexity of its operations, the range of the products and services offered, its geographical location, as well as the number of staff with appropriate experience and skills concerning the management of operational risks (Alogab *et al.*, 2018; De Cos, 2020; Martin, 2010). Banks have unique operational risk profiles which require a tailored approach to operational risk management based on the scale and materiality of their risks and the size of their organisation. The business-line managers are responsible for the day-to-day management of operational risks within each business unit. Consequently, they must ensure that each staff member within their specific business unit has a clear understanding, appreciation and risk awareness to enable effective operational risk management (Girling, 2013; Martin, 2010; Stanciu, 2010).

4.2.5 The monitoring and reporting of operational risk

The ISO (International Organisation for Standardisation) 31000 risk management standard (2009) prescribes that an organisation should establish effective monitoring and reporting mechanisms as these mechanisms will support and encourage accountability and ownership of risk (ISO 31000, 2009).

Operational risk monitoring and reporting plays a crucial role in banks' operational risk management procedures, as it ensures adequate and accurate operational risk information to ensure precise decision-making and successful operational risk management practices (Down, 2003; Hain, 2009).

The BCBS advises that appropriate monitoring and reporting procedures should be in place at board-, senior management-, and business-line levels that support the proactive

management of operational risks. Senior management is furthermore entrusted with the responsibility to ensure that the monitoring of material operational risk exposures and operational risk profiles of banks occurs regularly. They understand that operational risk monitoring and reporting is a continuously evolving process (BIS, 2010; Blunden & Thirwell, 2010).

In addition, Blunden and Thirlwell (2010) argued that effective operational risk monitoring and reporting would promote management involvement and consensus − resulting in continuous identification, assessment and control of operational risk.

Banks are finally encouraged to continually strive to improve the quality of their operational risk monitoring and reporting activities. They must ensure that operational risk reports are comprehensive, accurate, consistent, and actionable across all their business units and products (BIS, 2010; COSO, 2004; De Cos, 2020; Young, 2015).

4.2.6 The disclosure of operational risk

The BCBS also states that public disclosure of operational risk information will improve industry practice transparency, which promotes market discipline. The amount and type of disclosure should be aligned with the size, risk profile and complexity of a bank's operations. These disclosures should enable all relevant stakeholders to determine whether a bank can identify, assess, monitor and control its operational risks effectively and efficiently (Alogab *et al*., 2018; BIS, 2010; De Cos, 2020).

4.2.7 Operational risk mitigation

Multiple risk mitigation strategies are available to banks to mitigate operational risks (Nastase & Unchiasu, 2013). Azeem and Masood (2013), identified six mitigation strategies, including:

- Risk avoidance: Making the occurrence of an operational risk event impossible or extremely unlikely.
- Risk assumption: Accepting the likelihood of the occurrence of an operational risk event and undertaking no mitigating actions.

- Risk reduction: Limiting the likelihood of the occurrence of an operational risk event and/or reducing the eventual loss.
- Risk transfer: Accepting the likelihood of the occurrence of an operational risk event but reducing the eventual loss by transferring the risk to a third party by means of insurance.
- Hedging: Using hedging mechanisms such as futures markets to hedge against the possibility of the operational risk event occurring.
- Combination: Selecting a combination of the above methods.

It should, however, be noted that operational risk mitigation strategies are complementary to, rather than replacing sound internal operational risk controls within banks. Furthermore, it is essential that careful consideration should be given to the utilisation of risk transfer by means of insurance, as insurance is an imperfect substitute for sound operational risk controls and should, therefore, only be utilised in circumstances when other operational risk mitigation strategies are not feasible (BIS, 2021; BIS, 2011c).

4.2.8 Operational risk management tools

Identifying and assessing operational risks are fundamental aspects of an effective operational risk management process (Chapman, 2011; Young, 2022). The correct identification and assessment of operational risks enable banks to understand their risk profile better and thus allocate operational risk management resources and strategies more effectively (De Cos, 2020; Schuermann, 2014).

The tools available to banks to identify and assess operational risks are discussed below (BIS, 2011c).

4.2.8.1 Audit findings

Banks utilise internal auditing to enhance their business processes. It is also beneficial to bank regulators to obtain the required assurance on a bank's control environment, including essential information regarding its capital and liquidity levels. Audit findings primarily focus on controlling weaknesses and vulnerabilities and can also provide valuable information on the inherent risks due to internal and external factors (De Cos, 2020; BIS, 2011c; Staciokas & Rupşys, 2005).

However, it is essential to note that audit findings will only be effective in identifying and assessing operational risks if the senior management team of a bank supports the internal audit function effectively and implements an appropriate operational risk management structure (Sarrens, De Beelde & Everaert, 2006).

4.2.8.2 Internal losses: data collection and analysis

Data on internal losses provide valuable information for assessing banks' exposure to operational risks and the effectiveness of internal controls. Young (2022) pointed out that internal control should be a continuous process to be carried out at all levels within a bank. A thorough internal control process is critical for the ability of a bank to achieve its objectives and maintain financial viability (BIS, 1998; Young, 2022). Therefore, the following interrelated elements of internal control are vital with regard to operational risk management (BIS, 1998; Young, 2022):

- **Management direction and the control culture:** A bank's board of directors is responsible for reviewing and approving the overall business strategies and providing guidance and direction to senior management. Senior management is responsible for promoting integrity and high standards of ethics and establishing a risk culture within a bank that emphasises and demonstrates the importance of internal control to all personnel.
- **Risk recognition and assessment:** Effective internal control requires the recognition and continual assessment of all operational risks which could adversely affect the achievement of a bank's objectives.
- **Control activities and segregation of duties:** Control activities should be an integral part of the daily activities of a bank. This necessitates an appropriate control structure where the performance of control activities is clearly defined at every business level. It also requires a segregation of duties to ensure that bank personnel are not assigned conflicting responsibilities, which could negatively influence operational risk management effectiveness.
- **Information and communication:** An effective internal control system requires comprehensive internal financial, operational and compliance information and external market information concerning events and conditions relevant to decision-

making. Effective communication is essential to ensure that information is available to relevant bank personnel on demand.

- **Monitoring activities and the correction of deficiencies:** The overall effectiveness of a bank's internal controls should be continuously monitored. The monitoring of key operational risks should be part of the daily activities of a bank and the periodic evaluations conducted by the business lines and the internal audit function.

The BCBS regards internal controls as an essential tool for the management of operational risk and identified thirteen principles of internal controls for banks, which can be summarised as follows (BIS, 1998; Young, 2022):

- The board of directors should take responsibility for understanding all the major operational risks and ensuring that senior management takes the necessary steps to manage these operational risks effectively.
- Senior management is responsible for implementing strategies and policies approved by the board of directors, setting internal control policies, and monitoring the internal control systems.
- The board of directors and senior management must be jointly responsible for promoting high ethical standards and establishing a risk culture within the bank that prioritises internal controls.
- All material operational risks affecting a bank's performance must be continually assessed.
- Internal control activities must form an integral part of the daily activities of a bank.
- There must be an appropriate segregation of duties within a bank.
- Banks must have comprehensive financial, operational and compliance data. The information must be reliable, timely and accessible and must be provided in a consistent manner.
- Reliable information systems must be in place.
- Effective communication channels must ensure that information reaches the appropriate bank personnel promptly.

- The ongoing monitoring of internal controls must form part of the daily activities of a bank.
- An effective and comprehensive internal audit of the internal control system must be carried out by operationally independent staff. The internal audit function should report directly to the board of directors, its audit committee, and/or senior management.
- Internal control deficiencies must be reported to senior management and appropriately addressed in a timely manner.
- Bank supervisors should require every bank, regardless of its size, to have an effective system of internal controls that is consistent with the nature, complexity, and operational risks inherent in the bank's activities. These control systems must respond appropriately to fluctuations in the bank's environment.

Analysing internal loss events can provide insight into the causes of operational losses and whether control failures are isolated cases or systematic in nature. This information will enable banks to obtain an accurate and comprehensive overview of their operational risk exposures (De Cos, 2020; BIS, 2011c).

The Basel II- and Basel III regulatory frameworks specifically require banks to track their internal loss data to tie their risk predictions to their actual losses. The collected data can be utilised to validate the outputs produced by other operational risk management tools − which means internal data collection and analyses are vital operational risk management tools for banks (BIS, 2006a; BIS, 2011c).

4.2.8.3 External data collection and analysis

External data elements comprise gross operational loss amounts, dates, recoveries, and any additional information linked to operational loss events at other banks. The external loss data are then added during the modelling process, analysed and compared with a bank's internal loss data or utilised to identify weaknesses in the control environment and assist in analysing previously unidentified operational risk exposures. The external loss data enable banks to benchmark themselves against other banks with a similar size and risk profile, thereby improving their operational risk management procedures. Banks

should, however, pay careful attention to the selection of external data which is only relevant to their particular banking operations and risk exposures, as this selection could have a significant impact on how operational risks are understood and managed (De Cos, 2020; BIS, 2011c; Cope, 2010).

4.2.8.4 Risk assessments

In a risk assessment, a bank assesses the processes underlying its operations against a list of potential threats and vulnerabilities. It identifies what impact the risks might have on the bank. Subsequently, the effect of the identified risk is considered to determine and evaluate the inherent risk exposure. Following the review of intrinsic risks, the controls and control effectiveness is evaluated to establish the bank's residual risk (BIS, 2011c, De Cos, 2020).

Risk assessment is a crucial operational risk management tool to ensure business continuity as potential risks can be identified and analysed, enabling the design of appropriate risk-mitigating controls (De Cos, 2020; Jallow, Majeed, Vergidis, Tiwari & Roy, 2007).

In assessing operational risks, risk and control self-assessments (RCSA) are designed to determine past and future operational risk exposures, resulting in a risk register and incident reports. RCSA, typically evaluates inherent risk (the risk before controls is considered), the effectiveness of the control environment, and residual risk (the risk exposure after controls is considered) (Young, 2015).

However, the information gathered from the RCSA conducted by a bank's management team must be closely aligned with the control environment as assessed by internal and external auditors. The audit's findings are typically utilised to address the control breakdowns or enhancements identified by auditors and serve as a key operational risk management tool (De Cos, 2020; Jallow *et al.*, 2007).

The BCBS pointed out that the RCSA tool is mainly used for evaluating capital estimation, but also utilised for data loss and scenario analyses (BIS, 2011c).

4.2.8.5 Business process mapping

Business process mapping identifies the critical steps in a bank's business processes, activities and organisational functions. It identifies crucial operational risk points in a bank's overall business processes. This operational risk management tool allows a bank to identify and understand operational risks and their interdependencies with other risks and possible weaknesses in the operational risk management process. Based on these findings, the bank's management team can then prioritise subsequent actions (De Cos, 2020; BIS, 2011c).

4.2.8.6 Risk and performance indicators

Risk and performance indicators are risk metrics or statistics that provide insight into banks' operational risk exposure. Risk indicators, also known as key risk indicators (KRIs), are utilised to monitor the main drivers of vulnerabilities associated with key operational risks (De Cos, 2020; BIS, 2011c).

According to Young (2012), KRIs refer to statistical information, which could provide insight into a bank's risk position and should be reviewed periodically to serve as an early warning system for banks to initiate proactive control or preventative measures for risk exposures (Young, 2012; Young, 2006). According to the Institute of Operational Risk (IOR) (2010), KRIs can be regarded as metrics that can be used to monitor the identified risk factors over time as these metrics deliver information on the level of exposure to a given operational risk that the bank is experiencing at a given point in time. However, it is pertinent to note that an indicator becomes key when it tracks a risk exposure, which could significantly influence the bank's financial performance (IOR, 2010).

Furthermore, risk and performance indicators should be paired with escalation triggers (also referred to as risk thresholds) to provide early warning when operational risk levels approach or exceed a bank's threshold limits (De Cos, 2020; BIS, 2011c).

The ultimate benefit of managing KRIs, therefore, lies in the provision of predictive information to facilitate decision-making and enable preventative actions (Andersen, Häger & Vormeland, 2016; Beasley, Branson & Hancock, (2010); Kalyvas & Akkizidiz 2006).

4.2.8.7 Scenario analysis

Scenario analysis is a process by which expert opinions are obtained from various risk managers in a bank regarding the identification of potential operational risk events and the assessment of their possible outcomes (De Cos, 2020). In Chapman's (2011) view, scenario analysis is a strategic thinking tool that can assist decision-making and help an organisation prepare for an uncertain future. In scenario analysis, banks examine future developments and ideas as well as plausible outcomes to identify potential risks (Young, 2022). These scenarios study the trends and possible consequences in the banking environment to develop the strength and resilience that will enable banks to adapt to future scenarios and the risks involved (Young, 2022).

Scenarios enable banks to exercise strategic choice regarding whether to try shaping the future, adapting to events as they emerge or diversifying by investing in a range of products, new technologies and markets. Essentially, building scenarios can be regarded as making different pictures of an uncertain future by constructing different potential outcomes (Chapman, 2011).

When planning future strategies, scenario analysis can be used to identify and evaluate operational risk stages by considering which operational risks are likely to occur, the likelihood of these risks occurring, when these might occur, and the impact of these risks (Chapman, 2011; Young, 2022).

Scenario analysis depends on assembling a team with appropriate knowledge and experience in operational risk management (Chapman, 2011; Dutta & Babbel, 2014). It is, however, crucial that the quality of the data imported into the scenario identification process are of high integrity. Therefore, banks should ensure consistency in the scenario information and the information obtained from other operational risk management tools (BIS, 2010; Dutta & Babbel, 2014; Rosengren, 2006).

Furthermore, scenario analysis will be more effective if senior management and risk management personnel comprehensively understand the bank's operations and are sensitive to potential operational risk events (BIS, 2010; BIS, 2011c; Rosengren, 2006).

With this operational risk management tool, banks will be more resilient and prepared to respond more swiftly to operational risks (Chapman, 2011).

4.2.8.8 Comparative analysis

A comparative analysis compares the results of the various operational risk assessment tools to obtain a comprehensive view of a bank's operational risk profile. This includes comparing the frequency and severity of internal loss data with the self-assessment processes to test if these processes are functioning effectively. The scenario data of the bank can be added to augment internal and external data to better understand the severity of a bank's exposure to potential operational risk events (De Cos, 2020; BIS, 2011c).

4.2.8.9 Stress testing

When stress testing is applied to banking institutions, it involves analysing how banks would cope with hypothetical adverse scenarios, such as severe recessions or a financial crisis (Dent, Westwood & Segoviano, 2016). The 2007-2008 GFC highlighted substantial deficiencies in managing and measuring risk across the financial sector (Haldane, 2009).

Before the 2007-2008 GFC, banks developed and used stress-testing scenarios that proved significantly less detrimental than the catastrophic impact of the GFC itself, as these scenarios generated loss estimates that were well below the actual losses experienced by banks (BIS, 2009c). As a result, the role of stress testing in banks has rapidly evolved and grown in importance since the 2007-2008 GFC and is now regarded as an essential element of risk management for banks (BIS, 2009c; Haldane, 2009).

As an operational risk management tool, stress testing alerts banking institutions to certain extreme conditions and indicates the financial resources required to absorb losses should large shocks materialise (Young, 2022; BIS, 2009c). Banks must pay attention to the frequency of stress tests; it is recommended that they should be undertaken regularly and that the scenarios and sensitivities used in stress tests are reviewed periodically to ensure that they remain relevant. Specific attention should be devoted to historical events and hypothetical future events that consider new information and emerging operational risks in the present and foreseeable future (BIS, 2017b; BIS, 2018a).

When examining the results of stress tests, banks and authorities should clearly understand their key assumptions and limitations regarding scenario relevance and risk coverage. Therefore, stress-test results are only as accurate as the data, the methodologies utilised, and the assumptions made in producing them (Bank of England, 2016; Dent *et al*., 2016).

A bank's disclosure of the stress-testing results can further improve market discipline and provide confidence to external stakeholders regarding its resilience and ability to identify stresses. As a forward-looking operational risk management tool, stress testing can contribute to formulating a bank's strategic objectives (Bank of England, 2016; BIS, 2017b; BIS, 2018a; Dent *et al.*, 2016; Schuermann, 2014).

4.3 Operational risk management framework

Banks should establish an operational risk management framework within their organisation as this framework will enable banks to identify and establish a structured approach to managing operational risk and consequently support them in achieving the following important objectives (Young, 2022):

- To institute an integrated operational risk management environment.
- To provide a common understanding of operational risk.
- To develop a culture of operational risk awareness.
- To develop the required roles and responsibilities to manage operational risk effectively.

The achievement of the above-mentioned objectives will enable banks to address their operational risk exposures more effectively and consequently enable banks to (1) increase their shareholder value, (2) improve their competitiveness and (3) implement a more accurate capital allocation process for the management of operational risk (Girling, 2022; Young, 2022).

For the purpose of this study, the focus will fall on a framework for improving operational risk management, which will be discussed in terms of the following essential components: (1) the operational risk management strategy of a bank, (2) the risk culture of the bank,

and (3) the risk governance of a bank, which will be elaborated on in Sections 4.3.1 to 4.3.4 below.

4.3.1 The operational risk management strategy

A bank's operational risk management strategy sets the overall mission, goals, and objectives for managing operational risk. It should connect operational risk management to increasing shareholder value and improving its competitive nature (Girling, 2022; Young, 2022).

This will be elaborated on in Section 4.3.1.1 below, where effective operational risk management can help banks to obtain a competitive advantage in the market.

4.3.1.1 Operational risk as a competitive advantage

Managing all risks is vital for organisations to remain sustainable (Schulte & Hallstedt, 2018). Ferguson and Ferguson (2011) stated that successful risk management is critical to any organisation that requires allocating scarce resources to projects or activities to generate a competitive advantage and maximise possible long-term growth opportunities.

Elahi (2010) stated that when organisations can respond to and manage risks better than their competitors, they are in a favourable position to enter riskier business ventures with higher potential profits. Elahi (2010) further argued that if organisations are equipped with more robust risk management capabilities, they are more likely to grow faster in uncertain, volatile business environments, which could lead to a competitive advantage. Weber, Scholz and Michalik (2010) confirmed the view of Elahi (2010) when they stated that the improvement of risk management within organisations will be valuable for both science and the industry in which the organisation operates.

Since the 2007-2008 GFC, the BCBS has elevated the importance of operational risk management to enable banks to operate effectively (Eceiza, Kristensen, Krivin, Samandari & White, 2020). The BCBS further stated that operational risk in the banking sector explicitly causes volatility in banks' financial performance and financial stability (Cagan, 2009). If operational risk management is not addressed appropriately, it will have

severe negative consequences on the net worth of a bank (Cagan, 2009; Eceiza *et al.,* 2020).

A study by Fadun and Ove (2020) indicated a positive relationship between operational risk management and a bank's financial performance. Their findings revealed that sound operational risk management practices positively impact banks' financial performance.

However, studies by Altarawneh and Shafie (2018) and Olamide, Uwalomwa and Ranti (2015), had contradictory viewpoints on banks' operational risk management practices. Altarawneh and Shafie (2018) found a negative relationship between operational risk management and the ROE's of banks operating in Jordan, while Olamide *et al*. (2015) concluded that Nigerian banks' financial performance is unaffected by their operational risk management practices.

Despite these conflicting findings, banks are increasingly aware that effective and efficient management of operational risk will aid in the overall improvement of a bank's financial performance. This will also help achieve its strategic objectives. For these reasons, operational risk management should be regarded as an opportunity for gaining a competitive advantage and approached in this manner rather than from the perspective of merely adhering to regulatory requirements (Eceiza *et al*., 2020; Falih, Kasim, Yaseen, Sabah & Kadhim, 2020; Radomska, 2014).

The proactive management of operational risk can lead to improved efficiencies, higher productivity levels, lower funding costs and enhanced profitability levels − all contributing factors for banks to obtain a competitive advantage over their rivals (Gadzo, Kportorgbi & Gatsi, 2019; Falih *et al.*, 2020; Fung, 2006).

A study by Chioma, Okoye,Chidume and Nnenna (2021) concluded that operational risk management had a significant positive effect on the firm value of banks operating in Nigeria. Lyambiko (2015) had similar findings, where the returns of banks operating in Tanzania were found to be positively influenced by their operational risk management practices. These findings were also confirmed by a study conducted by Isoh and Nchang (2020) who found that operational risk management had a significant positive effect on the financial performance of commercial banks in Cameroon.

As a result, effective operational risk management is essential to a bank's financial stability, sustainability, and competitive nature (Andersen, Hager, Maberg, Naess & Tungland, 2012; BIS, 2006a; Cagan, 2009; Kirkpatrick, 2009; Rose, 2009).

The risk culture is a decisive factor in the risk management structure of an organisation as it ensures that the risk management objectives of the bank are aligned with its business strategy (Unterrheiner, 2017). An effective risk culture will ensure that every bank employee approaches and manages operational risk in the manner that a bank's board of directors and senior management expect (Gadzo *et al*., 2019; Unterrheiner, 2017). Therefore, a bank's board of directors and senior management are responsible for ensuring that its corporate culture continues to develop and improve regarding the management of risks − of which operational risks are of particular significance (BCBS, 2019c; De Cos, 2020).

Section 4.3.2 will elaborate on a bank's risk culture regarding the management of operational risks.

4.3.2 Risk culture

Since the 2007-2008 GFC, interest in risk culture has grown significantly. Risk culture in organisations is not a given and can be positively changed and improved with solid efforts from top management (McConnel, 2013; Unterrheiner, 2017). The role played by organisational risk cultures in shaping destructive risk management behaviours, including recklessness, avarice and imprudence, have been highlighted by Boatright (2016) as well as Asher and Wilcox (2022). Research suggests that the arguments on risk culture in organisations indicate the aspiration to ensure that risk management becomes a more prominent component of organisational decision-making and governance processes (Deloitte, 2012; Gallati, 2003; Power *et al.*, 2013). The Financial Stability Board (FSB) is responsible for setting international standards for the financial services industry and provides regular guidance to national regulators. It defines risk culture as: "*the norms, attitudes and behaviours related to risk awareness, risk-taking and risk management"* (FSB, 2021:1). Hillson (2012) defined risk culture as a set of mutual beliefs, values and knowledge that employees have about risk within an organisation. Furthermore, the FSB

considers a bank's risk culture adequate when it encourages sound risk-taking, proactively addresses emerging risks (beyond its risk appetite) and ensures that all employees conduct business activities legally and ethically (FSB, 2014; Jackson, 2015).

The BCBS highlights that a robust risk culture is critical for a bank to achieve sound corporate governance.[43] A corporate risk culture that supports and provides appropriate norms and incentives for professional and responsible behaviour lays the foundation for exercising good governance (Ashby, Power & Palermo, 2013; Banks, 2012; FSB, 2011; Smit, 2018; McConnel, 2013). In this regard, the board of directors should lead by establishing professional standards and corporate values that promote integrity for itself, senior management and all other bank employees (BIS, 2012; BIS, 2011c). To embed an effective risk culture in a bank's operations, a bank should aim to reach a risk-intelligent culture status. This implies that every employee understands the bank's approach to risks, takes personal responsibility to manage the risks related to their daily activities and encourages fellow employees to follow their proactive example. A bank's management systems and behavioural norms should encourage employees to make accurate risk-related decisions and exhibit appropriate risk awareness. To accomplish these objectives, the board of directors and senior management are responsible for setting the right tone and cultivating an enterprise-wide awareness of risks at all levels within the bank. A robust risk culture builds business resilience, minimises potential losses and ultimately can assist a bank in gaining a competitive advantage (Pritsch, Stegemann & Freeman, 2008; Smit, 2018; Toukalas, 2018). A risk culture binds together crucial elements in a bank, such as risk governance, risk management and compliance, and ultimately makes a bank more cohesive and resilient to internal and external disruptions (IFC, 2015; IRM, 2012c; Sants, 2010). To enhance a bank's risk culture and its interrelationship with risk

[43] *Corporate governance* is "the system by which companies are *directed*, in terms of (1) the company's strategic aims and (2) entrepreneurial leadership, *resourced* in terms of providing (1) the necessary financial- and human resources and (2) the necessary ICT resources, and *managed* using robust, defensible and prudent controls to (1) interface with internal- and external stakeholders, (2) establish risk management processes, (3) produce accurate, timely and relevant information for decision making, risk management and reporting, (4) comply with laws and regulations, (5) establish the company culture by setting the company's values and standards, and (6) reflect the perspective of the parent company as appropriate." (Chapman, 2011:35).

governance, the bank should devote careful attention to its risk culture framework. This will be discussed in Section 4.3.3 below.

4.3.3 The risk culture framework

The risk culture framework illustrated in Figure 4.1 comprises four risk culture drivers: risk competency, organisation, relationships and motivation (Deloitte, 2012). The importance of these four risk culture drivers will be discussed below.

Figure 4.1: Risk culture framework

Source: Adapted from Deloitte (2012).

4.3.3.1 Risk competence

Risk competence encompasses banks' ability to recruit competent and knowledgeable employees to manage operational risks (IFC, 2015; IRM, 2012c; Gallati, 2003). These employees will be given regular training opportunities to deal with the dynamic nature of operational risks. A stimulating environment where risk management skills and knowledge are encouraged, valued and developed is an essential feature of improving the risk competency levels of bank employees (Deloitte, 2012; IFC, 2015; McConnel, 2013).

4.3.3.2 Organisation

Organisation refers to banks' processes, procedures and governance systems that provide the appropriate infrastructure to manage operational risks effectively. These

policies, processes and procedures must contain sufficient management controls to ensure that risk-taking is precise, prudent, and aligned with a bank's risk appetite parameters. The roles and responsibilities of all bank employees should also be clearly defined (Deloitte, 2012; IFC, 2015; McConnel, 2013).

4.3.3.3 Relationships

Strong leadership and effective communication should carefully address the interactions between employees at the different hierarchical levels within banks. Communication of operational risk information should be a continual, iterative process of providing, sharing and obtaining the required information. Structured communication channels should ensure operational risks are swiftly identified, correctly understood and appropriately managed. Effective communication and strong leadership is a fundamental component of a bank's operational risk management practices and has been found to enhance risk awareness across all levels of a bank. Effective communication includes a sufficient diversity of perspectives, values and beliefs among bank employees to ensure that the status quo in the bank is consistently challenged and improved. The board of directors and senior management should provide the requisite leadership to establish an appropriate risk culture in a bank. If a bank's leadership team makes operational risk management a top priority, it will filter through to the rest of the bank (Gallati, 2003; Hiwatashi & Ashida, 2002; Huber & Funaro, 2018; McConnel, 2013; Smit, 2018; Unterrheiner, 2017). While the board of directors is primarily responsible for setting the right tone at the top, the senior management team provides employees with the necessary support to manage operational risks successfully. Therefore, strong leadership is essential for a bank to develop and maintain an effective risk culture that promotes the management of operational risks (Deloitte, 2012; IFC, 2015; McConnel, 2013).

4.3.3.4 Motivation

In the context of operational risk management, motivation refers to why bank employees support and promote operational risk management. The board of directors and senior management are responsible for ensuring that every employee in a bank fully understands the bank's risk appetite statement. This entails that a bank's incentive

system is designed so that prudent risk-taking and accurate decision-making are promoted and appropriately rewarded throughout the bank. Furthermore, it is directed that banks have an established process to enable whistleblowing and reporting of operational risks to the board of directors, senior management and other relevant stakeholders, such as the bank regulator (Deloitte, 2012; IFC, 2015; McConnel, 2013).

The risk culture should be integrated and influenced by a bank's risk governance practices rather than an isolated component. For banks to reap the benefits of effective operational risk management, the board of directors and senior management must demonstrate and exercise commitment to their risk governance responsibilities, which will positively influence a bank's risk culture.

As part of the effort to achieve sound operational risk management practices, the importance of risk governance will be discussed in Section 4.3.4.

4.3.4 The governance of risk

Achieving good corporate governance is challenging and includes a fair degree of complexity. However, sound corporate governance practices offer numerous benefits and should be integrated into the operational practices of all organisations. Good corporate governance requires an efficient executive team, a functioning legislature, an independent judiciary and a balance of powers. Therefore, good corporate governance is not achievable and sustainable without effective democratic institutions (Asif, 2019; Institute of Directors in Southern Africa (IoDSA), 2009; IoDSA, 2016; Nyamongo & Temesgen, 2013; Santiso, 2001).

Research by The World Bank Institute identifies six main characteristics of good corporate governance: (1) accountability, (2) effective government, (3) the lack of a regulatory burden, (4) the rule of law, (5) independence of the judiciary, and (6) the control of corruption (Kaufmann, Kraay & Zoido-Lobaton, 1999).

The past three decades have been characterised by many high-profile corporate failures and financial irregularities in the financial sector (Ashamu & Abiola, 2012; Blankenburg & Palma, 2009; Nyamongo & Temesgen, 2013; Asif, 2019). For this reason, increased attention has been focused on corporate- and risk governance. The BCBS recognised

the crucial need to establish appropriate governance practices for financial institutions and, therefore, gave much more attention to the understanding and improvement of banks' corporate and risk governance practices (BIS, 2006a; Nyamongo & Temesgen, 2013; Asif, 2019).

The following section will start by providing a perspective on corporate governance and how this plays a vital role in risk management. Thereafter, risk governance will receive attention, specifically operational risk management.

4.3.4.1 Corporate governance

Financial institutions prosper in an environment of sound and balanced governance. The term *governance* derives from the Latin word *gubernare,* which means "to steer", referring to the steering of a ship (Keasey, Thompson & Wright, 2005). Corporate governance comprises a central and dynamic aspect of business and is built on principles that guide organisations with clear direction rather than by exercising control (Keasey *et al.*, 2005; Solomon, 2007; Steenkamp, 2007; Rotberg, 2014).

The Cadbury Report (UK) defined corporate governance as: "*the system by which companies are directed and controlled"* (Keasey *et al*., 2005; Smerdon, 1998). The Hampel Report (UK), Higgs Report (UK) and Smith Report (UK) also accepted this definition provided by the Cadbury Report (UK) as their working definition of corporate governance (Chapman, 2011; Keasey *et al*., 2005). Aras and Crowther (2008), however, argued that corporate governance could be considered an environment of trust, ethics, moral values and confidence.

The King IV Report (RSA) provided a more comprehensive definition of corporate governance by defining corporate governance as the exercise of ethical and effective leadership by the governing body towards the achievement of the following governance outcomes: (1) ethical culture, (2) good performance, (3) effective control, and (4) legitimacy (Barrier, 2003; IoDSA, 2016; Keasey *et al.*, 2005; Kotz & Schmidt, 2017; Smerdon, 1998).

Corporate governance is concerned with maintaining a balance between economic and social goals and aligning the organisation's objectives with its shareholders and the

greater society. It, therefore, involves a set of relationships between an organisation's board of directors, the management team, its shareholders and other stakeholders (Cadbury, 1999; IoDSA, 2016; Mehran, Morrison & Shapiro, 2011).

Investors value organisations that practise good corporate governance, and from a bank's perspective, this is important since investor confidence significantly generates positive cash flows (Altaf, Ayub, Shabbir & Usman, 2021). In contrast, poor corporate governance practices pave the way for fraudulent activities and may further cause banks to suffer from poor financial performance (Chapman, 2011; Mehran *et al.*, 2011; Najjar, 2012; Vaughn & Ryan, 2006).

Research by the McKinsey Consulting Group reveal that investors in developing economies are willing to pay a premium of up to 28% for shareholding in organisations with a reputation for exercising good corporate governance, compared to organisations with a reputation for exercising weak corporate governance − even when the organisations produce similar financial results (Solomon, 2007). Erkens, Hung and Matos (2012) argued that a positive relationship existed between sound corporate governance practices and the financial performance of banks, particularly during a financial crisis (Erkens, Hung & Matos, 2012; Aebi *et al.*, 2012).

The importance of corporate governance in achieving organisational success and contributing towards the welfare of the greater society cannot be over-emphasised (Chapman, 2011; Filatotchev & Wright, 2005). Examples of severe corporate collapses include large investment banks, such as Barings Bank, Bear Sterns, and Lehman Brothers; the American Energy Corporation, Enron; and the second-largest American telecommunication company, Worldcom. These collapses have demonstrated the critical importance of improving and reforming banks' corporate governance and risk governance practices at local and international levels (Asif, 2019; Chapman, 2011; Fraser & Simkins, 2010; Kirkpatrick, 2009).

For developing economies, such as Ghana, corporate governance is essential since the financial markets of these economies are still under-developed and, therefore, banks are the most significant source of finance for organisations and individuals and the main depository unit for the economy's savings (Levine, 2004; Nsaibi *et al.*, 2020).

It is vital to note that corporate governance in banks differs from that of other organisations for the following four reasons (Kotz & Schmidt, 2017; Levine, 2004; Nyamongo & Temesgen, 2013):

- Banks are highly leveraged entities and, therefore, subject to higher volumes of informational asymmetries and confronted with a greater incidence of the agency problem.
- Banks are complex organisations and, therefore, extremely complicated to evaluate.
- Banks hold assets with maturity dates that are significantly longer than other sources of funds.
- The financial stability and resilience of the banking sector play a critical role in the economic well-being of a country.

Additionally, these reasons highlight the importance of corporate governance within banks (Kotz & Schmidt, 2017; Levine, 2004; Nyamongo & Temesgen, 2013).

Sound corporate governance practices are, however, also essential components for banks' successful operation and risk management procedures (Altaf *et al.,* 2021; Handley-Schachler, Juleff & Paton, 2007). Rathod (2018) agreed with Handley-Schachler *et al.* (2007) that corporate governance is the basic framework from which effective risk management emerges, develops and improves. Corporate governance elaborates on the division of responsibility within a bank for risk management. It determines how each level in a bank‘s risk management will be implemented and managed − which is also referred to as risk governance (Sheedy & Griffin, 2018; Rathod, 2018). This is the focus of the next section.

4.3.4.2 The governance of operational risk

Risk governance emerged from the 2007-2008 GFC and highlighted that traditional approaches to corporate governance within the financial sector regarding the management of risks were ineffective (Beltratti & Stulz, 2012). Gontarek (2016) defined risk governance as the framework through which the bank's board of directors and senior management establish strategies to identify, measure and manage risks. According to De

Cos (2020), risk governance could be described as the framework within which risk management functions in an organisation.

The FSB (FSB, 2013) articulated that the crucial elements of risk governance are: (a) a board of directors that can analyse the bank's risk exposures and can challenge executive decisions constructively; (b) an effective, and well-resourced comprehensive risk management function; (c) independent assessment of the risk management framework through internal audit and external parties; and (d) a culture that prioritises risk management (FSB, 2013; Sheedy & Griffin, 2018).

Consistent with the FSB's (2013) explanation of risk governance, the BCBS provided new regulatory guidance concerning bank governance in 2010 and further updated it in 2015. These updates emphasised the accountability for risk management by all staff, the existence of an independent risk function and the assurance of risk management systems and controls (BIS, 2015c; Sheedy & Griffin, 2018). One of these risks that should be carefully governed and managed by banks is operational risk (Asif, 2019).

Asif (2019) stated that the governance of operational risk is critical for successfully managing operational risk and an essential component in a bank's ultimate objective to accomplish financial stability. Banks with effective corporate governance that pay specific attention to their risk governance practices have a significantly higher probability of managing operational risk and allocating capital effectively (Erkens, Hung & Matos, 2012; Strzelczak, 2008; OECD, 2014; Sheedy & Griffin, 2018).

In contrast, banks with weak corporate governance- and risk governance practices are more exposed to operational risks, such as the mismanagement of capital by bank managers and managers who act in their own best interest rather than that of their shareholders (Fooladi, Nikzad & Chalestori, 2011; OECD, 2014; Sheedy & Griffin, 2018). Research also found that banks with poor risk governance practices and weak operational risk processes are more likely to be adversely affected regarding their long-term investment performance (Financial Services Authority (FSA), 2009; Levine, 2004).

The process of corporate governance includes effective risk governance procedures that pay sufficient attention to the management of operational risks by banks, as it monitors

and manages operational risks from the top down and ensures that all relevant stakeholders benefit from them (Altaf *et al.,* 2021; Ayub, Shabbir, & Usman, 2021; Chapman, 2011; Sheedy & Griffin, 2018).

Corporate governance and risk governance place responsibility on a bank's board of directors to ensure that appropriate systems and policies are in place to manage all operational risks effectively. Respectable board practices and good corporate and risk governance are imperative to manage operational risk effectively and efficiently (Aebi, Sabato & Schmid, 2012; Chapman, 2011; Kirkpatrick, 2009; Sapovadia, 2008; Nsaibi, Abibi & Rajhi, 2020).

Therefore, it can be stated that good risk governance is essential to promote effective operational risk management practices for banks. It is vital to enable banks to maximise shareholder value and achieve financial stability, risk resilience and sustainability (Asif, 2019; BIS, 2008; De Cos, 2020; FSA, 2009; Kotz & Schmidt, 2017; Young, 2018).

As demonstrated by the above-cited literature, it is crucial that banks acknowledge, advocate and exercise proper corporate governance, which includes risk governance, since it plays a vital role in driving effective operational risk management (Altaf *et al*., 2021; McShane *et al*., 2015). The following section will explore the governance structure for the effective management of risk.

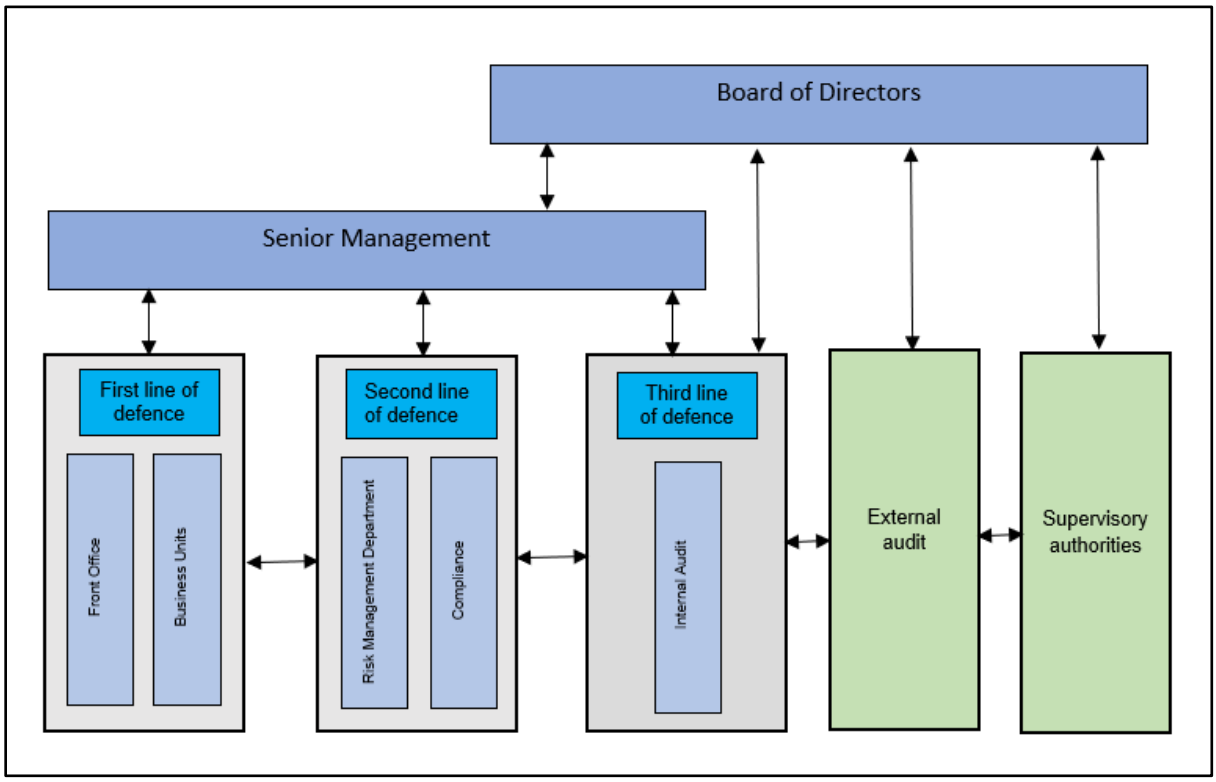
4.3.4.3 The risk governance structure

A risk governance structure defines the roles of all the stakeholders in risk management and the processes by which risk information is collected, aggregated, analysed and communicated to provide a robust infrastructure for management decisions in banks (Fraser & Simkins, 2010; Sheedy & Griffin, 2018; Stein & Wiedemann, 2016).

For the governance of risk to be successful, a bank is required to have: (1) a dedicated board of directors, (2) a chief risk officer (CRO) who is part of the bank's executive board, (3) a strong senior management team, (4) business units, (5) a risk management function, and (6) internal and external auditors. The risk management function should be led by an experienced and independent CRO who is given appropriate status and compensation that corresponds with the importance of the role. It is recommended that the CRO and

Chief Executive Officer (CEO) ideally be at the same hierarchical level within the organisation, and both report directly to the board of directors. A bank should clearly define an appropriate risk governance structure by incorporating input from all relevant stakeholders. The governance structure should be consistent with a bank's business operations and regulatory requirements. Effective risk governance should include a risk management operating model, which incorporates the three lines of defence (3LOD) (see below): staff which will engage and interact with the board of directors, senior management and external bodies to ensure effective and efficient enterprise-wide risk management (Bessis, 2015; BIS, 2009a; BIS, 2014b; Committee of European Banking Supervisors, 2010; Donnelly, 2011; Erkens *et al.*, 2012; Fraser & Simkins, 2010; IFC, 2015; Scherbina, Afanasyeya & Lapina, 2013). Figure 4.2 illustrates the 3LOD model, which will be discussed below.

Figure 4.2: The three lines of defence



Source: Adapted from IFC (2015).

The 3LOD is a model developed for structuring the roles, responsibilities and accountabilities regarding risk management, decision-making and achieving an effective

risk governance structure across an entire banking institution. The 3LOD model complements and promotes the successful governance of operational risks within banks by regularly interacting with the board of directors, senior management and external bodies (such as external auditors and supervisory authorities) (Bessis, 2015; BIS, 2011a; Mabwe, Ring & Webb, 2017).

The principles advocated by the BCBS on managing operational risk stipulate that banks should utilise the 3LOD to manage operational risk. However, it is essential to note that the size, nature, complexity, as well as risk profile of a particular bank's operations, will determine the degree of formality in which the 3LOD are implemented (BIS, 2009b; BIS, 2011c; BIS, 2014b; Modiha, 2012).

Mabwe, Ring and Webb (2017) maintained that when the 3LOD model is correctly embedded within an enterprise-wide approach to managing risk and complemented by an effective communication network between the different lines of defence, it should provide a coherent and comprehensive methodology for the management of operational risk. This will reduce the frequency and impact of risk events and accurately reflect a bank's risk culture and objectives (Mabwe *et al.*, 2017; Ribaj & Bejtja, 2016).

The 3LOD model comprises the board of directors, senior management, the front office, a central risk management function, compliance, internal audit and external control bodies. The 3LOD model will be discussed from an operational risk management perspective, elaborated in Sections 4.3.4.3.1 to 4.3.4.3.6

4.3.4.3.1 The role of the board of directors

A bank's board of directors should ensure that the bank's risk management strategy is closely aligned with the organisation's mission, vision, values and objectives. This risk oversight role specifically includes the following responsibilities:

- Comprehending the amount of risk a bank can accept in pursuit of its objectives, which should clearly be defined in its risk appetite[44] statement.

[44] *Risk appetite* is defined as the written articulation of the aggregate level and types of risk that a bank will accept or avoid in order to achieve its business objectives (Gontarek, 2016; Stulz, 2014).

- Understanding a bank's risk profile, including the risks the bank faces, the potential impact, and the classification of such risks.
- Monitoring and controlling the compliance obligations of the bank, including the regulatory requirements and the continuously changing industry specifications.
- Ensuring that the bank's risk management infrastructure corresponds with the complexity of its business operations, the risks it faces, and the laws, regulations and industry requirements (IFC, 2015; Luburić, 2017).

4.3.4.3.2 The role of senior management

A bank's senior management team is responsible for providing the necessary infrastructure and processes for operational risk management and the appropriate instruments for employees to execute their tasks effectively. Senior management, in addition, has the responsibility to appoint a CRO responsible for managing the day-to-day operational risk activities. The CRO must have sufficient seniority, authority and experience and remain independent from business-line decisions and management. Due to the recommended independence of the CRO from the central risk management department, sufficient interaction between the CRO and the central risk management department is also endorsed so that all the risk managers have access to sufficient information about risk from the different lines of business within a bank (IFC, 2015; Hu & Denizkurdu, 2020).

4.3.4.3.3 First line of defence

The front office is the first line of defence and is responsible for the day-to-day risk management activities within a bank's operational level. The responsibilities of the front office include the identification, measurement, analysis, management and monitoring of all operational risks that arise within their scope of business (Mabwe *et al.*, 2017; Radičević, Trivanović & Stanojević, 2017).

The management division of the front office is the closest to the changing nature of risks. It is, therefore, best placed to take the necessary action to manage and mitigate emerging risks. The front office is also responsible for preparing periodic self-assessment reports,

identifying the status of risk management concerns and compiling mitigation plans when required (Bessis, 2015; Freeman, 2018; Mabwe *et al.*, 2017).

4.3.4.3.4 Second line of defence

The second line of defence comprises executive management, the central risk management department and an independent compliance function, which is responsible for: (1) enforcing effective operational risk management practices by providing a formal risk management framework, (2) establishing a risk culture that promotes and advances the effective management of operational risks, (3) designing the operational risk management tools to be utilised by the first line of defence for identifying and managing operational risks, and (4) ensuring that the bank complies which appliable regulations concerning the management of operational risk (Bessis, 2015; BIS, 2015b; Hu & Denizkurdu, 2020; Luburić, 2017; Mabwe *et al.*, 2017).

The second line of defence should remain independent of the first. A clear separation of duties should exist between the risk-taking business lines and the risk-supervising units. The risk management department should be centralised within the bank to guide the implementation of operational risk policies and monitor their proper execution and compliance with all the necessary operational risk processes (Bessis, 2015; BIS, 2015b; Mabwe *et al.*, 2017).

Furthermore, it is necessary to understand the critical importance of an independent compliance function in successfully operating a bank's second line of defence. The compliance function is responsible for promoting and monitoring that a bank operates with the required integrity and compliance with all the applicable laws, regulations and internal policies (BIS, 2014b; BIS, 2018b; Deloitte, 2019).

Compliance starts from the top; therefore, it should be fully supported and promoted by the bank's top management. It will be most effective in a bank where high standards of honesty and integrity are emphasised and the board of directors and senior management provide the required leadership. Compliance concerns every bank employee and should be considered an essential component of a bank's operational risk management practices (BIS, 2014b; BIS, 2018b; Deloitte, 2019).

For the compliance function to operate effectively, it must have sufficient authority, stature, independence, resources and access to the board of directors. A bank's management should respect the independent duties of the compliance function without unnecessary interference. The compliance function should report directly to the board of directors on vital operational risk management issues and concerns (BIS, 2014b; BIS, 2018b; Deloitte, 2019).

Finally, it is crucial to acknowledge and understand that the first and second lines of defence may perceive operational risk differently, resulting in varying perspectives and perceptions of operational risk information, emphasising the importance of effective communication among the different lines of defence (Luburić, 2017). The senior management team of the bank is therefore entrusted with the responsibility to resolve these ambiguities and to identify suitable solutions, which have been found to make a constructive contribution towards enhancing the manner in which the management of operational risks occurs (Bessis, 2015; Luburić, 2016; Ribaj & Bejtja, 2016; Mrsik, Nenovski & Dimov, 2017).

4.3.4.3.5 Third line of defence

The third line of defence, representing the next level of control, belongs to internal audit, which provides independent assurance to senior management and the board of directors on an extensive range of objectives. These objectives include the efficiency and effectiveness of processes created in the first and second lines of defence, ensuring that these processes operate effectively. Therefore, corporate audit activities ensure that internal control measures are applied and that all bank employees comply with corporate policies, standards, procedures and regulations. They also have the authority to make recommendations and supervise their accurate execution when necessary (Bessis, 2015; Luburić, 2017; Mabwe *et al.*, 2017; Ribaj & Bejtja, 2016).

Therefore, the third line of defence assists banks in accomplishing their objectives by establishing a systematic, disciplined approach to evaluate and improve the effectiveness of operational risk management, control- and governance processes (Radičević *et al.*, 2017; Ribaj & Bejtja, 2016; Rosenberg, 2016).

For the third line of defence to function optimally, it must be based on the highest level of independence and objectivity. Specific structures should be instituted to accomplish these high levels of independence and objectivity: organisational independence should be established, a direct reporting line for the chief audit executive should be implemented, and unrestricted access to senior management and the board of directors should be provided (BIS, 2015a; Deloitte, 2020; Rosenberg, 2016).

Internal auditors are required to conduct annual risk assessments to identify a bank's business units that exhibit high levels of residual risk.[45] Therefore, the third line of defence should challenge a bank's operational risk management controls, processes and systems. For this reason, the personnel working in this function must be competent, appropriately trained, and not involved in developing and implementing the operational risk management framework (BIS, 2011c; BIS, 2015a; Modiha, 2012; Rosenberg, 2016).

4.3.4.3.6 External controls

Finally, an additional external level of control complements the 3LOD within a bank. This external level of control comprises the external audit function and supervisory authorities.

4.3.4.3.6.1 External audit

The external audit function can be considered the fourth line of defence, entrusted with providing independent assurance to the shareholders, the board of directors and senior management concerning the accurate and fair view of a bank's financial statements. However, the risk information gathered by the external audit function is limited to the financial reporting of risks. It does not include the way in which senior management and the board of directors manage operational risks. Although the external audit function is positioned outside a bank, it is a crucial part of its overall governance and control structures because it ultimately ensures compliance with all relevant standards and regulations (BIS, 2015b; Minto & Arndorfer, 2015; Ribaj & Bejtja, 2019).

The external audit function assures a bank's shareholders of the effectiveness and efficiency of processes. It delivers valuable information to the board of directors, the audit

[45] *Residual risk* can be defined as the risk remaining after risk treatment has occurred (Brenner, 2007).

committee, executive management and supervisory authorities. The external audit function is also regarded as an outside check on internal governance functions, which includes providing independent observations on the effective functioning of the 3LOD (Mabwe *et al.*, 2017; Minto & Arndorfer, 2015; Ribaj & Bejtja, 2019).

4.3.4.3.6.2 The role of supervisory authorities

Bank regulatory agencies issue specific regulations and guidelines governing the operations and activities of banks. The supervisory roles include monitoring and inspecting banks to assess compliance with relevant laws, regulations and supervisory directives. Supervisory authorities specifically assist in designing and shaping the internal control environment and the risk governance structure by issuing guidelines on the appointment of board members, the required capital reserve ratios, and offering prescriptions on minimum disclosure requirements for banks. The supervisory authorities of different countries have also realised the value of adopting the BCBS principles prescribed by the Basel regulatory frameworks. These principles guide the effective and efficient management of operational risk and have contributed significantly to improving the banking sector's governance and management of operational risk (BIS, 2014b; De Cos, 2020; IFC, 2015; Hu & Denizkurdu, 2020).

It is crucial that the banking regulator and/or monetary authorities of all countries undertake the essential leadership role of adequately supervising banks by interacting and communicating with them regularly regarding establishing, improving and promoting effective and efficient operational risk management practices. Central bank regulators should then liaise to develop regulatory requirements that banks must meet. These proactive risk management measures taken by central banks will be much more beneficial than a reactive approach where the emergence of operational risks continually challenge banks that then have to await guidance from their central banks before taking corrective measures (De Cos, 2020; McConnell, 2013; Stanciu, 2010).

4.4 Conclusion

The objectives of the BCBS are to enhance financial stability, improve supervisory capability and raise the quality of banking supervision internationally. The BCBS pursues these objectives by setting minimum standards for bank regulation and supervision. Standards are set by sharing supervisory issues, approaches, and techniques to promote a shared understanding and improve cross-border cooperation (De Cos, 2020; BIS, 2014a; Goodhart, 2011; Magnus & Korpas, 2017).

The Basel III regulatory framework was initially designed for large international banks operating in BCBS member jurisdictions, which ignited concerns that banks might misinterpret and fail to implement the framework's requirements, as only a limited number of banking experts have the necessary expertise and experience to implement the requirements correctly and effectively (BIS, 2004; BIS, 2011a; Ferreira, Jenkinson & Wilson, 2019). This is a particular challenge and concern for banks in developing economies and specifically for banks operating in Ghana because of a lack of supervisory guidance, weak risk culture and governance practices, high compliance costs and limited access to specialised skills, experience, and technology (Andrae, 2014; Bjarnesjo & Lundberg, 2013; Fratianni & Pattison, 2015; Gagakuma & Kpawul, 2017; Nyantakyi & Sy, 2015; Ozili, 2019; Schmaltz, Pokutta, Heidom &; Ozili, 2019; BIS, 2014f; Bjarnesjo & Lundberg, 2013; Nyantakyi & Sy, 2015; Taylor, 2010). Ghanaian banks have not managed to implement the operational requirements of the Basel III regulatory framework and, as a result, have not been able to manage operational risk effectively (Bank of Ghana, 2019; Jones, 2022; Gadzo, Kportorgbi & Gatsi, 2019; Nana-Cobbinah, 2014).

Despite these implementation challenges, Ghanaian banks must keep abreast of regulatory developments in the global banking industry as directed by the Basel regulatory frameworks, specifically focusing on operational risk management (Amponsah-Mensa, 2021). If Ghanaian banks cannot implement the operational risk management requirements of the Basel III regulatory framework, they will not optimally manage operational risk. As a result, it will harm their financial performance, risk resilience, competitiveness, and sustainability (Arthenful *et al.,*2020; Gadzo, 2019; Jones, 2022).

To assist Ghanaian banks in implementing the operational risk management requirements of the Basel III regulatory framework, the importance of operational risk management, risk culture and risk governance practices should be clearly understood, appreciated, and implemented as it will provide Ghanaian banks with the required infrastructure to manage operational risks effectively (Evans & Selim, 2015; IFC, 2015; IRM, 2012c; Koomson, 2011). Risk culture is a continuous, dynamic process and can be significantly enhanced by solid leadership and commitment from top management. Research has found that a risk culture that encourages and sustains regular interaction among relevant parties enables and enhances banking institutions' operational risk management practices. For this reason, all bank employees should understand and acknowledge the importance of risk culture and its significant role in a bank's ability to identify and manage operational risk (IFC, 2015; Jackson, 2015; Power et al., 2013; McConnel, 2013). Banks with strong risk governance practices have a higher probability of managing operational risk successfully and allocating capital effectively, therefore the governance of operational risk is an essential component in a bank's ultimate objective to increase shareholder value and accomplish risk resilience and financial stability (Erkens, Hung & Matos, 2012; Gapko, 2020; Strzelczak, 2008; OECD, 2014; Sheedy & Griffin, 2018).

The literature review in Chapters 2, 3 and 4 provided the necessary perspective to understand the need, relevance, and significance for undertaking the research, as no study exists in presenting Ghanaian banks with guidelines to improve their operational risk management practices and attempt to enhance their level of compliance with the operational risk management requirements stipulated by the Basel III regulatory framework. Through the review of the literature, it can be stated that risk management, and in particular, operational risk management, is of vital importance in safeguarding and promoting the financial stability and financial soundness of Ghanaian banks (Evans & Selim, 2015; IFC, 2015; IRM, 2012c; Koomson, 2011). However, successful operational risk management cannot be achieved in isolation in banking institutions and depends on a robust risk culture and sound risk governance practices (Gakpo, 2020; Altaf *et al.*, 2021).

Therefore, the study's results will benefit banks operating within the Ghanaian banking sector. It will provide banks with guidelines to advance operational risk management by paying specific attention to their risk culture-, and risk governance practices. These guidelines will furthermore assist Ghanaian banks in advancing operational risk management requirements stipulated by the Basel III regulatory framework.

The next chapter, which discusses the research methodology for this study, will elaborate on how the research objectives will be achieved.

Chapter 5 - Research design and methodology

5.1 Introduction

Research is defined as an individual's action to obtain data logically and systematically with the ultimate objective of increasing knowledge (Saunders *et al.*, 2012). During the research process, data are collected and interpreted to answer specific research questions (Quinlan, Babin, Carr, Griffin & Zikmund, 2015).

According to Kothari and Garg (2019), research is the search for new knowledge through an objective and systematic method of seeking a solution to a problem. Therefore, *research* refers to the systematic method of defining a problem, formulating a hypothesis, collecting data, analysing the data and reaching specific conclusions (Cooper & Schindler, 2014; Kothari & Garg, 2019). These conclusions can either provide a solution to the problem or formulate a theoretical explanation.

The design and methodology of a research study are crucial as they provide direction to the researcher in planning and implementing a project in a manner that will most likely achieve the intended research objectives. This chapter is therefore divided into the following sections:

- Determining the need for research.
- Explaining the research process.
- Explaining the research approach.
- Elaborating on the research design and methodology.
- Ensuring validity, reliability and practicality.
- Explaining the data-collection procedure.
- Explaining the data-analysis procedure.
- Adhering to the ethical considerations.

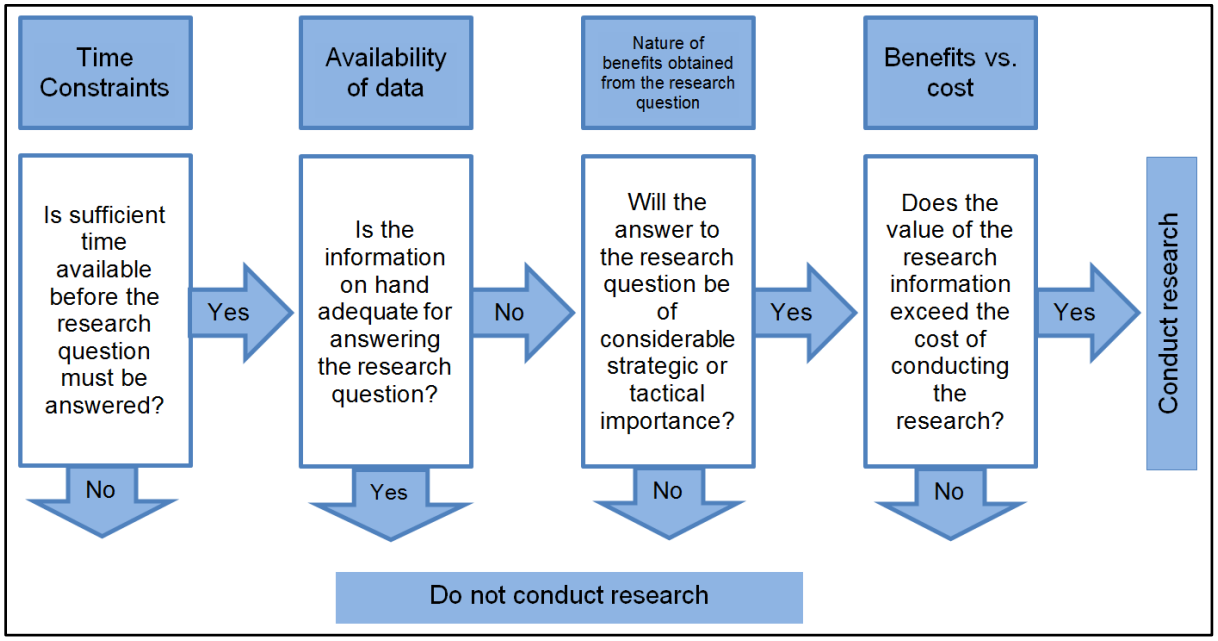
The need for the research will be discussed next.

5.2 Determining the need for research

Researchers will agree that data are required to answer a research question. However, in some instances, it is practically impossible to investigate specific research questions owing to the unavailability of current data, time constraints, the nature of the benefit to be obtained, and the cost involved in conducting research (Cooper & Schindler, 2014).

Figure 5.1 below illustrates the decision-making process in determining the viability of conducting a research project. Only when the answers to the questions concerning the time constraints, the availability of data, the nature of the benefits, and the cost of conducting the research, are identified will a researcher be able to determine the possibility of conducting and completing the research.

Figure 5.1: Determining the need to conduct research



Source: Adapted from Eicker (2016).

Therefore, before embarking on this project, the four questions, as illustrated above, had to be considered. The answers to these questions are summarised below.

Table 5.1: Determining whether to conduct research for this study

Considerations that determine the need for research	Formal questions	Answers in terms of this study	Does this study qualify to move on to the next consideration?
Time constraints	Is sufficient time available for Ghanaian banks to comply with the operational risk management requirements stipulated by the Basel III regulatory framework?	Yes, the international deadline specified by the BCBS for implementing the revised requirements for the management of operational risk was initially scheduled for January 2022, but due to the international Covid-19 crisis, the new implementation date is January 2023 (BIS, 2017a; BIS, 2018b; De Cos, 2020).	Yes
Availability of data	Is the current information adequate to assist Ghanaian banks in implementing the operational risk management requirements stipulated by the Basel III regulatory framework?	No. Although the Basel III regulatory framework is globally available to all banking institutions, Ghanaian banks have implementation challenges and require additional guidance and support to implement the regulatory framework's operational risk management requirements effectively and successfully (Adjirackor *et al*., 2017; Ackah & Asiamah, 2014;	Yes

Considerations that determine the need for research	Formal questions	Answers in terms of this study	Does this study qualify to move on to the next consideration?
		Akosah, 2016; Antwi, 2020; Dahou *et al.*, 2009).	
Nature of the benefits obtained from the research question	Are operational risk management guidelines for the effective management of operational risk of strategic or tactical value for Ghanaian banks?	Yes. It is envisioned that Ghanaian banks will benefit from the research findings and the guidelines provided, as it will assist them in managing operational risk more effectively. The international competitiveness of Ghanaian banks will be improved as their level of Basel III compliance will be enhanced (BIS, 2011a; Al-Hares, AbuGhazaleh & El-Galfy, 2013).	Yes
Benefits versus costs	Does the value of the research project exceed the cost of conducting the research?	Yes, the value of the research exceeds the cost to be incurred as the study's findings will be utilised to make recommendations to banks in Ghana on how to improve their operational risk management practices. It will also assist the Ghanaian banks in advancing their level of compliance with the Basel	Yes

Considerations that determine the need for research	Formal questions	Answers in terms of this study	Does this study qualify to move on to the next consideration?
		III regulatory framework (Gakpo, 2021).	

Source: Adapted from Babin & Zikmund (2016).

Following the answers to the four questions presented in Figure 5.1, it can be concluded that research needs to be conducted on the current operational risk management practices of Ghanaian banks.

It was, therefore, decided to continue with the next step, namely designing the research process. This will be discussed in Section 5.3 below.

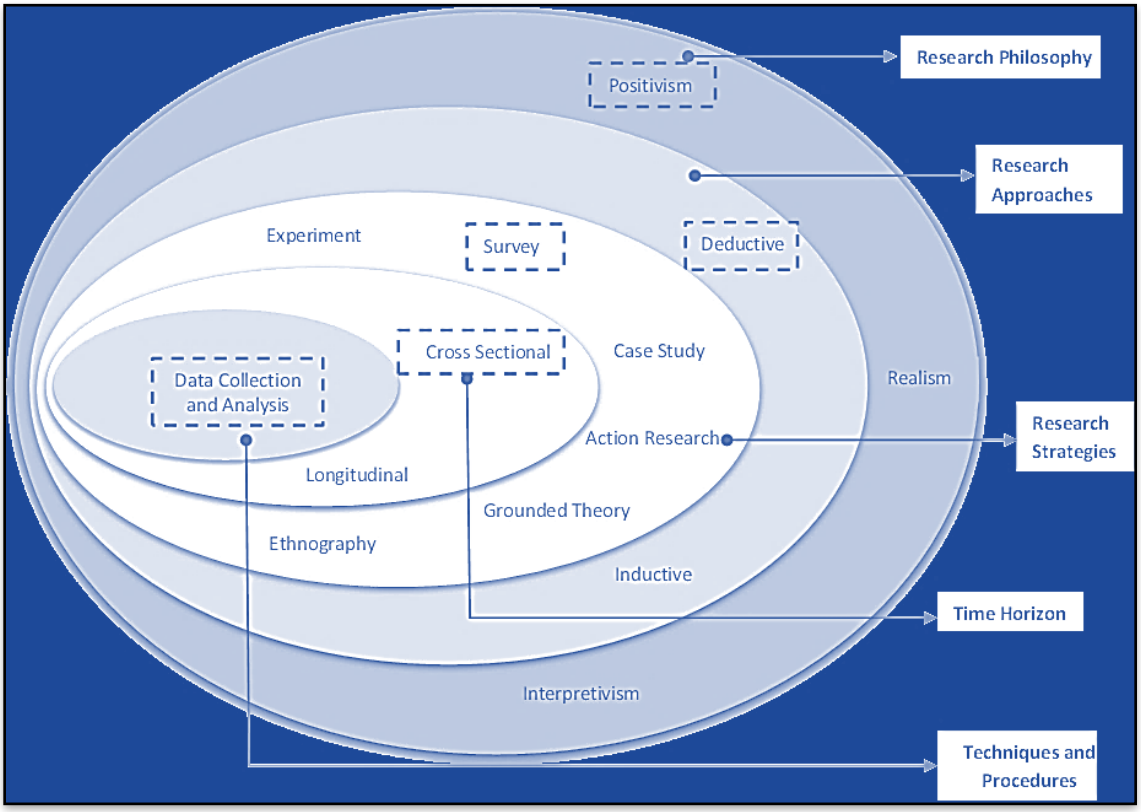
5.3 The research process

The *research process* is a multi-stage process that delivers a planned, systematic approach to a project to ensure that all the individual stages of the process form a cohesive whole (Saunders *et al.*, 2012; Schindler, 2019). With this in mind, the research process "onion" described by Saunders *et al.* (2012) was employed to guide the study.

The research "onion" refers to the paradigms, strategies and methods utilised by the researcher during the research process. The research "onion" concept summarises the essential matters to consider before undertaking any research project. The different layers of the "onion" serve as a platform for the following considerations: the philosophical position of the researcher, the research approach to be adopted, suitable research strategies, the research timelines, and the data-collection techniques to be adopted.

Figure 5.2 presents the research "onion" used as a guideline and justification for this study's research design.

Figure 5.2: The research "onion"



Source: Adapted from Saunders *et al.* (2012).

The following sections will discuss the different components of the research "onion".

5.3.1 Research philosophy

Saunders *et al.* (2012) argued that the first layer of the research "onion" concerns the research philosophy. The term *research philosophy* relates to the development of knowledge and the nature of that knowledge (Saunders *et al.*, 2012).

Research is founded on philosophical assumptions related to the researcher's view or perception of reality (Bell, Bryman & Harley, 2018). According to Easterby-Smith, Thorpe, Jackson and Lowe (2012), such philosophical assumptions can be understood in terms of epistemology and ontology.

Epistemology refers to understanding how individuals have come to know what they claim to know (Mutezo, 2015) and ontology concerns the nature of the world and reality (Saunders et al., 2012; Neuman, 2011).

5.3.2 The positivist research paradigm

Newby (2010) defined *positivism* as an approach to conducting social research by applying the principles developed by the natural sciences. Gill and Johnson (2010) stated that positivistic scholars view the world as concrete and tangible and pointed out that a definite separation between the researcher and the research object is essential. This separation avoids researcher subjectivity which may have a detrimental effect on the research process (Gill & Johnson, 2010).

Chilisa (2011) stated that positivistic research paradigms are appropriate for research projects that have the following characteristics:

- The purpose of the research is to discover laws that are generalisable and govern the universe.
- It is assumed that the nature of knowledge is objective.
- The research methodology to be utilised is quantitative, correlational, experimental or comparative.
- The techniques for gathering data are mainly through questionnaires, observations or experiments.

This study will investigate elements in operational risk management practices at Ghanaian banks. It is concerned with the external reality, has clear objectives and attempts to question the predominant social constructions of reality. Furthermore, it is not only interested in creating new knowledge but also envisions making a meaningful contribution towards the management and governance of operational risk by Ghanaian banks. Therefore, the positivistic research paradigm was deemed most appropriate because investigating and researching knowledge management practices and learning within organisations (more specifically, financial organisations) are profoundly embedded within a social context (Saunders *et al.*, 2012; Mutezo, 2015; Schindler, 2019).

5.4 The research approach

Saunders *et al.* (2012) pointed out that the second important layer of the research "onion" is selecting a deductive, inductive or abductive research approach.

Deductive reasoning occurs when the conclusion is derived logically from a set of premises; the conclusion is accurate when all the premises are found to be accurate. Inductive reasoning is appropriate when a gap exists in the logical argument between the conclusion and the premises observed. Therefore, data are collected and analysed, and a theory is developed. Abductive reasoning occurs when research starts with the formulation of a conclusion. Given the conclusion, a set of premises that can adequately explain the conclusion is then postulated. It is reasoned that if the set of premises is true, the conclusion will also be true (Ketokivi & Mantere, 2010; Saunders *et al.*, 2012; Schindler, 2019).

A deductive research approach was implemented since this research started with exploring operational risk management through a literature study and continued by testing the theoretical propositions with an appropriate research instrument (see Section 5.7).

The research design adopted for this study will be explained in the next section.

5.5 The research design and methodology

Section 5.5 is dedicated to the research design for this study. The following will be covered in Sections 5.5.1 to 5.5.9: (1) the research design, (2) the research method, (3) the time dimension and availability of data, (4) the population, (5) the sampling method, (6) the sample size, (7) the response rate, (8) the level of measurement and (9) the pre-testing procedure for the research instrument.

5.5.1 Research design

The research design is a critical part of the overall research process as it can be considered the blueprint for answering the research questions (Creswell, 2014; Schindler, 2019; Kothari & Garg, 2019; Tustin *et al.*, 2010). A researcher is responsible for selecting the most suitable research design to address the research questions and achieve the research objectives (Saunders *et al.,* 2012).

For this study, a non-experimental descriptive research design was selected to address the research questions and achieve the research objectives. A non-experimental research design describes the phenomenon and examines relationships between different phenomena without directly manipulating conditions experienced during the research process (Creswell, 2014; Schindler, 2019).

Because of the dynamic nature of operational risk management within the financial services sector, ample information was available on operational risk and the management thereof, making a non-experimental descriptive research design most appropriate for this study (Creswell, 2014; Saunders *et al.*, 2012).

5.5.2 Research method

Two main methodological choices exist, namely qualitative and quantitative. Qualitative research refers to the approach that uses interpretive techniques to understand the meaning behind a phenomenon. On the other hand, quantitative research refers to using numeric data gathered through a structured and validated data-collection instrument to test, for example, hypotheses and relationships (Sanders, Cogin & Bainbridge, 2014).

For this study, a quantitative research method was deployed to address the research questions and achieve the research objectives. Quantitative research stems from empirical generalisations, which can be used to determine future outcomes or solve a particular research problem (Schindler, 2019; Mutezo, 2015; Tustin *et al.*, 2010). Quantitative research involves collecting primary data from a representative sample to generalise the results to the target population. In other words, the ultimate objective of quantitative research is to produce theories and truths about behaviour and relationships applicable to various circumstances (Newby, 2010).

Thus, the primary quantitative data were collected from Ghanaian bank personnel with expertise in operational risk management, risk governance and compliance, bank supervision, as well as the implementation of the Basel regulatory frameworks in order to generalise the results to Ghanaian banks through statistical analyses.

5.5.3 Time dimension and the availability of data

The time aspect of a research project plays a vital part in the research design and its final execution (Babbie & Mouton, 2011; Schindler, 2019). In this study, it was essential to ensure that data collection occurred as swiftly and effectively as possible since the international deadline for banking institutions to comply with the Basel III regulatory framework's requirements is January 2023 (BIS, 2018b; De Cos, 2020). This would allow sufficient time for analysing the data and developing operational risk management guidelines for Ghanaian banks before the international implementation deadline.

When investigating a particular phenomenon at a specific time, Saunders *et al*. (2020) advised that a cross-sectional study be undertaken instead of a longitudinal study, as cross-sectional studies are more suited when time constraints are present. As this study aimed to examine the current state of operational risk management practices in Ghanaian banks, a cross-sectional study was conducted. Data were collected only once, as opposed to a longitudinal study where this process is repeated over an extended period (Saunders *et al.,* 2012; Schindler, 2019). The argument for selecting a cross-sectional study was strengthened by the fact that the study's objectives could be accomplished faster and at a lower cost while minimising error sources caused by changes over time (Saunders *et al.,* 2012; Schindler, 2019).

Data were collected over a period of 22 weeks: from 15 May to 30 October 2019. The primary data were collected from Ghanaian bank personnel with the relevant background and knowledge of operational risk management, risk governance and compliance, bank supervision, and the implementation of the Basel regulatory frameworks.

Sections 5.5.4 – 5.5.7 address the matters relating to the deepest layer of the research "onion": the study's population, sampling method, sample size and response rate.

5.5.4 The population

The population is an essential source of information for any research project (Cooper & Schindler, 2014; Saunders *et al*., 2014) and can be defined as a group of elements that shares a common set of characteristics (Babin & Zikmund, 2016). Therefore, the accessible population for this study was Ghanaian bank personnel with relevant background, knowledge, experience and expertise in operational risk management, risk governance and compliance, bank supervision, and the implementation of the Basel regulatory frameworks.

5.5.5 Sampling method

When conducting research, two sampling methods are available to the researcher: probability sampling and non-probability sampling (Cooper & Schindler, 2014; Saunders *et al.*, 2012).

Probability sampling methods are based on random selection − a controlled procedure that assures each element in the population is granted an equal opportunity of being selected. Various sampling techniques exist within probability sampling, including simple random-, systematic-, stratified- and cluster sampling (Cooper & Schindler, 2014; Saunders *et al.*, 2012; Newby, 2010).

In contrast to probability sampling methods, non-probability sampling methods are not random. With these sampling methods, all the elements in the population are not awarded an equal opportunity for selection, as the population is generally unknown. Various methods are available when using non-probability sampling, including quota-, purposive-, multiplicity-, volunteer- and haphazard sampling (Cooper & Schindler, 2014; Saunders *et al.*, 2012; Newby, 2010).

A non-probability sampling technique was selected for this study, namely purposive sampling Using purposive sampling, the researcher deliberately decides on the individual elements to be included based on a variety of criteria, including specialist knowledge of the research problem, accessibility, capacity, and willingness to participate in the study (McDaniel, Lamb & Hair, 2008; Kothari & Garg, 2019; Vijayamohan, 2022). In this study, the potential respondents were identified based on their area of specialisation, knowledge

of operational risk management, risk governance and compliance, bank supervision, and the implementation of the Basel regulatory frameworks.

Saunders *et al.* (2020) also found that purposive sampling is best suited:

- When working with small samples.
- Where no sampling frame to select potential respondents is available to the researcher.
- When a researcher is working with “difficult-to-identify” members of a population.

5.5.6 Sample size

When conducting research, it is essential to consider the sample size. The sample size relies on the type of study and is generally influenced by practical restrictions, such as access to respondents (Quinlan, 2011). With non-probability sampling, the sample size depends on the research questions and objectives (Saunders *et al*., 2020).

In order to ensure that the sample is homogeneous, the researcher had to ensure that the Ghanaian bank personnel identified as possible respondents were carefully selected based on their relevant background and knowledge of the subject area. Unfortunately, no such database or list was available in the public domain. Consequently, a database of Ghanaian bank personnel with the relevant background, experience and knowledge of operational risk management, risk governance and compliance, bank supervision, and the implementation of the Basel regulatory frameworks had to be developed.

One hundred and twenty-six (126) Ghanaian bank personnel with the required specialised knowledge were identified. This database was developed by web searches, utilising networking opportunities at local and international conferences, and the inputs from a fieldworker employed at the Ministry of Finance in Ghana at the time of the study. The Ghanaian bank personnel included in the database were employed by the 23 banks operating in Ghana at the end of 2018 (Bank of Ghana, 2022; PwC, 2018). The database included the names, surnames, email addresses, the banks where the potential respondents were employed and their areas of specialisation. The sample size of this study is 57 Ghanaian bank personnel with the necessary background knowledge, experience and expertise.

As stated above, the Ghanaian bank personnel were carefully selected based on their knowledge, experience and expertise in operational risk management, risk governance and compliance, bank supervision, and the implementation of the Basel regulatory frameworks. The inclusion of specific criteria made the sample homogeneous and, therefore, feasible (Fricker, 2008; Kaplan & Saccuzzo, 2008). Fricker's (2008) and Kaplan and Saccusso's (2008) viewpoints were validated by Zikmund *et al.* (2013) when they stated that "*only a small sample is required if the population is homogeneous."* Moreover, Stutely (2003) advised that a minimum sample of 30 is necessary to perform statistical analyses. Stutely's view was acknowledged by Saunders *et al.* (2020), who stated that statisticians had found that a sample size of 30, or more, will result in a sampling distribution for the mean that is very close to a normal distribution.

Therefore, due to the respondents' homogeneity and the sample size of more than 30, the 57 Ghanaian bank personnel were deemed to be an acceptable sample size for this study.

5.5.7 Response rate

Although this study aimed to provide guidelines for managing operational risk collectively rather than individually for Ghanaian banks, it was necessary to keep track of how many questionnaires were sent and received from each of the 23 Ghanaian banks. According to Cook, Heath and Thompson (2000), response representation can sometimes be more significant than response rates. Table 5.2 indicates the number of questionnaires distributed to and returned by each of the 23 Ghanaian banks.

Table 5.2: A summary of the questionnaire distribution to Ghanaian banks

Bank name	Number of distributed questionnaires	Number of returned questionnaires
Absa Bank Ghana Limited	6	3
Access Bank (Ghana) PLC	6	4
Agricultural Development Bank PLC	6	2
Bank of Africa Ghana Limited	6	2
CalBank PLC	6	2
Consolidated Bank Ghana Limited	6	3
Ecobank Ghana PLC	6	2
FBN Bank (Ghana) Limited	6	2
Fidelity Bank Ghana Limited	2	2
First Atlantic Bank Limited	6	3
First National Bank (Ghana) Limited	6	2
GCB Bank PLC	6	2
Guaranty Trust Bank (Ghana) Limited	6	3
National Investment Bank Limited	6	2
OmniBSIC Bank Ghana Limited	2	2
Prudential Bank Limited	6	5

Bank name	Number of distributed questionnaires	Number of returned questionnaires
Republic Bank (Ghana) PLC	6	3
Societe General Ghana PLC	2	2
Stanbic Bank Ghana Limited	6	2
Standard Chartered Bank Ghana PLC	6	2
United Bank for Africa (Ghana) Limited	6	2
Universal Merchant Bank Limited	6	3
Zenith Bank (Ghana) Limited	6	2

Source: Author (2019).

Of the 126 questionnaires sent via email to the possible respondents, only 48 were initially returned. The fieldworker followed up with possible respondents who at first did not complete the questionnaire and, in some cases, personal appointments were made to collect the completed questionnaires. Tustin *et al*. (2010) indicated that this approach could positively affect the response rate in survey research − which was the case for this study as an additional nine questionnaires were received. Consequently, a total of 57 completed questionnaires were received from respondents.

When calculating a response rate, the number of completed questionnaires should be divided by the number of questionnaires distributed to possible respondents (OECD, 2005). The response rate for this study is 45.23% (57/126 = 0.4523 x 100 = 45.23%). This response rate was deemed acceptable since it is similar to other studies where data were collected via email questionnaires (Schillewaert, Langerak Duhamel, 1998; Opperman, 1995; Comley, 1996, Tse, Tse, Yin, Ting, Yi, Yee & Hong, 1995, Metha & Sivadas, 1995).

Galloway (2005) noted that a lower response rate is acceptable if the researcher is confident that the respondents truly represent the population. The sample in this study was considered sufficient because the respondents were carefully selected based on their areas of specialisation, and every bank operating in Ghana at the time was represented.

5.5.8 Level of measurement

For survey research, four measurement scales are available to the researcher: nominal, ordinal, interval and ratio. These four measurement scales have unique characteristics and allow different statistical tests to be conducted (Cooper & Schindler, 2014; Gill & Johnson, 2010; Sulivan & Artino, 2013).

This descriptive study, used nominal, ordinal and interval scales to conduct statistical tests and analyses. These measurement scales are described in Sections 5.5.8.1 to 5.5.8.3, explaining why they were considered the most appropriate for the study.

5.5.8.1 Nominal scales

Nominal scales are categorical variables with no inherent order to the categories. Categories are simply labelled. The collected data can be categorised, and numbers can be assigned to each category, making it an efficient method to organise data in descriptive studies (Cooper & Schindler, 2014; Schindler, 2019; Sullivan & Artino, 2013; Norman, 2010).

5.5.8.2 Ordinal scales

Ordinal scales are categorical variables with a meaningful order of categories, but there exists no measurable distance between the categories. Ordinal scales are ideal in research studies where the objective is to conduct non-parametric statistical tests, such as computing modes, medians, chi-squares, and correlations (Gill & Johnson, 2010; Schindler, 2019; Sullivan & Artino, 2013; Norman,2010).

5.5.8.3 Interval scales

Interval scales are continuous variables and are not categorised as in the case of nominal- and ordinal variables. By computing the sum or means of two or more ordinal variables,

an approximately continuous variable can be created. Continuous variables are ideal for statistical methods, such as correlations and regression analyses (Sullivan & Artino, 2013; Norman, 2010).

Pre-testing is crucial if one is to have confidence in the accuracy of the measurement instrument. This will be discussed in Section 5.5.9

5.5.9 The pre-testing procedure

Saunders *et al.* (2012) explained the importance of placing the research instrument through a pre-testing procedure before initiating the data-collection phase. Schindler (2019) substantiated the view by affirming that the pre-testing procedure is critical in the overall data-collection phase. Pre-testing ensures that valid and reliable measurement questions are developed to form part of the research instrument. Babin and Zikmund (2016) argued that the research instrument must undergo a pre-testing procedure to eliminate all the uncertainties and errors that may have arisen during the development of the research instrument.

To adequately address this study's research questions, a questionnaire was used to collect the necessary data. The pre-testing procedure was implemented for two reasons: (1) to ensure that there were no errors or uncertainties in the questions or the instructions to the participants, and (2) to ensure that the appropriate data were collected to answer the study's research questions.

The pre-testing of the questionnaire was conducted in two phases. The first phase included consulting with a statistician to ensure that each question was clearly formulated. In the second phase, the questionnaire was distributed to two groups. Group A consisted of six academics and research experts, and Group B of five banking practitioners in the South African banking sector. The academics and research experts in Group A consisted of three research experts with a research interest in operational risk management, all employed in the Department of Finance, Risk Management and Banking at Unisa. The other three academics had relevant experience in questionnaire design and were from the Department of Business Management at Unisa. The five banking practitioners in Group B represented the five largest banks in South Africa, namely Absa Group Ltd.,

FirstRand Ltd., Nedbank Group Ltd., Standard Bank Group Ltd. and Investec Ltd. Each banker had extensive experience in risk management or was involved with implementing the operational risk management requirements of the Basel III regulatory framework at their respective banks.

The two pre-testing groups were requested to express their opinions on the clarity of the questionnaire and provide recommendations on how the questionnaire could be improved (Babin & Zikmund, 2016; Clow & James, 2014; Saunders *et al.*, 2012). The main points they were requested to consider were:

- Whether there were vague or missing instructions.
- Whether any bias was detected in the wording of the questions.
- Whether the questions were ambiguous.
- Whether there were overlapping question scales or selection options.
- Whether more than one question was asked at the same time.
- Whether the questions were too lengthy.
- The time it took to complete the questionnaire.

After considering the contributions and recommendations of the statistician and the two pre-testing groups, the questionnaire was finalised for use in the data-collection phase.

5.6 Validity, reliability and practicality

Babbie and Mouton (2011) emphasised the importance of ensuring the reliability and validity of the research instrument. This is crucial as the research instrument directly influences the extent to which fellow researchers and subject experts can learn and acquire new knowledge and how valid and accurate conclusions can be drawn from the investigated phenomenon. Saunders *et al.* (2012), as well as Schindler (2019), agreed with Babbie and Mouton (2011) by acknowledging the importance of ensuring the validity, reliability and practicality of the data-collection instrument. The essential considerations regarding validity, reliability and practicality are discussed in Sections 5.6.1 to 5.6.3.

5.6.1 Validity

The validity of data collection is based on how well the method describes or measures what it intended to describe or measure (Saunders *et al.*, 2012). According to Babbie and Mouton (2011), validity refers to the accuracy of the measurement process employed in the study. Therefore, validity is concerned with whether the empirical measurement instrument adequately and accurately reflects the meaning of the concept under consideration (Babbie & Mouton, 2011; Cooper & Schindler, 2014; Schindler, 2019).

Two major forms of validity exist when conducting research: external and internal validity (Schindler, 2019; Saunders *et al.*, 2012; Clow & James, 2014).

External validity is concerned with the extent to which the findings of a research project can be generalised to the entire population. External validity for this study was achieved by ensuring that the sample group was a true representation of the population of the study (Schindler, 2019; Saunders *et al.*, 2012).

Internal validity refers to the degree of confidence that the relationships being tested are consistent and not influenced by other factors. Internal validity, therefore, relates to the ability of the research instrument to measure what the researcher intended to measure (Clow & James, 2014; Gill & Johnson, 2010).

Three additional categories of internal validity exist, including content validity, criterion-related validity and construct validity − which will be discussed in Sections 5.6.1.1 – 5.6.1.3 (Clow & James, 2014; Gill & Johnson, 2010).

5.6.1.1 Content validity

Content validity refers to the extent to which the questionnaire provides sufficient coverage of the investigative questions guiding the research. In addition, content validity addresses how the research instrument (questionnaire) can involve a representative sample of the study population. It is, therefore, closely related to external validity. If a project includes a representative sample of the population, then content validity has been achieved (Babin & Zikmund, 2016; Kothari & Garg, 2019; Saunders *et al.*, 2012).

In this study, content validity was achieved through a review of the draft questionnaire by the statistician, fellow academics and banking practitioners regarded as specialists in operational risk management and risk management research. This was accomplished during the pre-testing of the research instrument (see Section 5.5.9). On completion of the pre-testing procedure, the recommended amendments and modifications were incorporated to produce the final questionnaire.

5.6.1.2 Criterion-related validity

Criterion-related validity refers to the ability of the research instrument to predict a future outcome or the existence of a present problem (Babin & Zikmund, 2016; Cooper & Schindler, 2014; Kothari & Garg, 2019; Saunders *et al.*, 2012). Criterion-related validity did not apply to this study, as the purpose of the research instrument was not to measure how well one measure predicts an outcome but rather to establish the current situation among Ghanaian banks concerning the management of operational risk (Saunders *et al.*, 2012; Cooper & Schindler, 2014). The analyses of this study are explanatory rather than predictive (Cooper & Schindler, 2014).

5.6.1.3 Construct validity

Construct validity refers to the ability of the research instrument to provide evidence-based theory (Cooper & Schindler, 2014; Hair, Black, Babin & Anderson, 2014; Saunders *et al.*, 2014). Babin and Zikmund (2016) explained construct validity as the extent to which a research instrument measures the presence of the constructs it intends to measure.

Construct validity did not apply to this study, as the purpose of the research instrument was not to measure any underlying constructs but rather to obtain factual information on how the management of operational risk was dealt with in Ghanaian banks (Cooper & Schindler, 2014).

5.6.2 Reliability

Reliability is concerned with whether the data-collection techniques and analytical procedures will produce consistent findings if repeated on another occasion or replicated by a different researcher (Cooper & Schindler, 2014; Saunders *et al.*, 2012). Babin and

Zikmund (2016) defined reliability as the degree to which the data-collection instrument is free from error and delivers consistent results for the period over which the data-collection phase is conducted.

In this study, reliability was determined by the questionnaire's strength and robustness and the data collection's consistency. These aims were achieved by thoroughly testing the questionnaire for content validity during the pre-testing phase of the study (see Section 5.5.9) and by distributing the questionnaire to, and collecting it from, all the respondents over the same period − which started on 15 May 2019 and concluded on 30 October 2019.

5.6.3 Practicality

Practicality refers to the necessary operational requirements to ascertain if a study can be successfully completed (Benson & Bowman, 2019). Cooper and Schindler (2014) identified two essential considerations when referring to practicality: economy and convenience.

Regarding the aspect of the economy, the financial resources and time constraints were carefully considered before commencing with this study. With regard to the convenience of the research instrument, meticulous attention was paid to the design and layout of the questionnaire to ensure accurate data gathering and that completing the questionnaire was as easy and convenient as possible. A statistician was recruited to determine if the questionnaire questions were appropriately formulated to collect the intended data (Cooper & Schindler, 2014; Kothari & Garg, 2019).

5.7 Data-collection procedure

In the views of Schindler (2019) and Knapp (2008), the ultimate objective of non-experimental survey research is to collect accurate data and describe the understanding, opinions and attitudes of the sample group of individuals representing the target population at a specific point in time.

Crowther and Lancaster (2009) pointed out that the questionnaire is the primary data-collection instrument when undertaking survey research. Creswell (2014) believed that

data collection via questionnaires is the most practical research method as it is cost-effective and can be administered within a short period without compromising the research's validity and reliability. For this study, a questionnaire was used as the data-collection instrument.

A questionnaire was considered the optimal data-gathering method for the following reasons:

- Questionnaires were more feasible as time and financial constraints to visit Ghanaian banks were considered.
- Questionnaires were to be distributed and collected via email or in person by employing a fieldworker. The eligible bank personnel identified to participate in the survey were approachable via this method.
- It was the most efficient and effective way to reach Ghanaian banks.
- The respondents could complete the questionnaires in their own time. This is believed to have positively affected the response rate and enhanced the study's objectivity.

5.7.1 Survey design

Newby (2010) explained that the point of departure in questionnaire design is a well-defined problem statement with clear objectives. The absence of ambiguity in the questionnaire design is, therefore, imperative. Cooper and Schindler (2014), in addition, believed that a questionnaire could only be regarded as successful if it accomplishes the following objectives:

- Every respondent is motivated to provide accurate responses.
- Every respondent is motivated to provide a sufficient amount of information.
- Every respondent is encouraged to answer all questions.
- Every respondent is discouraged from early withdrawal from the study.
- The questionnaire leaves every respondent in an optimistic frame of mind regarding their participation in the survey.

Careful attention should be given to the design of the questionnaire. For this reason, the pre-testing procedure (see Section 5.5.9) is critical in completing the questionnaire design (Cooper & Schindler, 2014; Saunders *et al.*, 2012).

It is, however, important to acknowledge both the advantages and disadvantages of questionnaires when collecting data. These are listed in Table 5.3.

Table 5.3: The advantages and disadvantages of questionnaires

Advantages	Disadvantages
Depth and complexity of data	Respondent bias or reaction
Flexibility and simplicity	Data collection and analysis
Speed	Fear and antagonism
Feedback which enhances the validity	Lack of control and unreliability
Personal and motivating	Some questioning devices are limited

Source: Crowther & Lancaster (2009).

The previously mentioned objectives and the advantages and disadvantages of questionnaires were carefully considered during the design phase of the study. Eventually, the questionnaire comprised four sections: the informed-consent letter, the cover letter, the instructions, and the questions, all of which will be discussed below.

5.7.1.1 Informed-consent letter

The anonymity and confidentiality of the participants and the data they provide are crucial for safeguarding their interests and well-being. Participants were assured that their responses would remain confidential, and they were free to withdraw at any time. They were further assured that no reference would be made to any individual in the presentation of results, the analysis of data, or the discussion of the outcomes. The respondents were informed that the collected data would be safely stored for five years (Saunders *et al.*, 2014; Zikmund *et al.,* 2013).

5.7.1.2 The cover letter

The objective of the cover letter was to deliver the necessary background and explain the purpose of the study to the participants. In addition, the cover letter describes the possible

benefits of the research and, most importantly, assures the voluntariness of participation. A well-formulated cover letter also improves the response rate; therefore, special attention was devoted to its precise formulation (Newby, 2010; Saunders *et al.*, 2014; Schindler, 2019).

5.7.1.3 The instructions

Saunders *et al.* (2014) argued that the instructions are crucial to achieving a high response rate and should provide clear guidelines on how the respondents should complete each section of the questionnaire. As there was no direct contact between the researcher and the participants in this study, the instructions were formulated clearly to prevent ambiguity and confusion.

5.7.1.4 The questions

According to Newby (2010), the ordering of questions should be logical and ideally commence with general and neutral questions to build the respondent's confidence. Next, core and more complex questions should be introduced, followed by more sensitive and opinion-based questions. Schindler (2019) pointed out that this exact pattern of questioning within a questionnaire is a critical component for improving the quality of the collected data in survey research; as a result, this approach was implemented, and the main body of the questionnaire contained the actual questions.

5.7.2 Question types

The questionnaire consisted of closed- and open-ended questions.

5.7.2.1 Closed-ended questions

In closed-ended questions, respondents are given specific, limited alternative responses and requested to choose the option closest to their viewpoint. Therefore, researchers should have detailed knowledge of all aspects of interest in order to be able to pre-specify categories of responses (Zikmund *et al.*, 2013).

Clow and James (2014) maintained that the major advantages of closed-ended questions include the following:

- Easy and accurate data coding and entry.
- A limited number of responses.
- Immediate statistical treatment, which translates to savings in cost and time.

For most closed-ended questions, the respondents were requested to select only one answer, but in questions 2, 6, 16, 20, 31, 33 and 35 of the questionnaire, the respondents could select more than one answer. A copy of the questionnaire can be found in Appendix A.

5.7.2.2 Open-ended questions

Saunders *et al.* (2012) argued that open-ended questions are particularly valuable in questionnaires when the study is exploratory and the researcher requires a detailed answer to a specific question. Cooper and Schindler (2014) further advised that open-ended questions in questionnaires should be kept to an absolute minimum, as these questions are time-consuming and could discourage respondents from completing the entire questionnaire.

For these reasons, a limited number of open-ended questions were included at the end of the questionnaire to obtain additional information and equip the researcher with a deeper understanding of Ghanaian banks' specific challenges concerning operational risk management. The inclusion of the open-ended questions is believed to have positively contributed to answering the research questions and accomplishing the study's research objectives.

5.7.3 Method of collection

In this study, the data were collected in the following manner.

A fieldworker employed by the Ministry of Finance and a permanent resident of the capital of Ghana, Accra, was appointed. Several virtual meetings were held with the fieldworker throughout the data-collection period. At the introductory virtual meeting, the study's background, purpose and objectives were explained. The fieldworker was provided with the questionnaire, the informed-consent letter and the database of Ghanaian bank personnel to whom the questionnaires would be distributed. Two additional meetings

were held to monitor the progress and, specifically, the collection of the questionnaires. The *modus operandi* to ensure a high response rate was also discussed (see Tustin *et al*., 2010). Therefore, the fieldworker followed up on individuals who had yet to respond to the request to complete the questionnaire.

A final virtual meeting was held once the target response rate was reached. This concluded the data-collection phase, and the fieldworker was thanked for his commitment, determination and enthusiasm. Upon completing this phase, the fieldworker couriered the completed questionnaires to the researcher.

5.7.4 Choice of measuring scale

Since a non-experimental descriptive research design was used, it necessitated quantitative data collection. It was, therefore, necessary to measure variables across an ordinal scale (Saunders *et al.*, 2012; Tustin *et al.*, 2010).

For the closed-ended response categories, a four-point Likert scale was chosen to collect the data, owing to its reliability and ability to provide a greater amount of data. This is particularly useful when analysing the data through inferential statistical techniques (Cooper & Schindler, 2014; Schindler, 2019). Within the questionnaire, two variations of the four-point Likert scale were utilised, ranging from "strongly agree" to "strongly disagree" and also from "a very large extent" to "no extent".

The questionnaire was designed with pertinent questions after conducting a thorough literature review (see Chapters 2, 3, and 4). The topics covered in the questionnaire (see Appendix A) and the rationale for each question are presented in Table 5.4.

Table 5.4: Questions to Ghanaian banking professionals

Topic	Rationale
Bank demographics	• To determine the different business lines offered by each bank. • To obtain information on the level of experience of participants.

Topic	Rationale
	• To obtain information on the area of specialisation of participants.
Operational risk management information	• To determine the implementation status of the Basel regulatory frameworks regarding the management of operational risk. • To ascertain which operational risk management tools are utilised for identifying and assessing operational risk. • To determine the extent to which operational risks are monitored. • To determine the extent to which reporting mechanisms are in place at board level that support the proactive management of operational risk. • To determine the extent to which reporting mechanisms are in place at senior management level that support the proactive management of operational risk. • To determine the extent to which reporting mechanisms are in place at the business-line level that support the proactive management of operational risk. • To determine the extent to which public disclosure of operational risk management information allows stakeholders to assess a bank's approach to operational risk management. • To determine the level of agreement on whether effective operational risk management assists in freeing up capital.

Topic	Rationale
	• To determine the level of agreement on whether effective operational risk management lowers profit and loss volatility. • To determine the level of agreement on whether the effective management of operational risk is a competitive advantage.
The governance of operational risk	• To determine the existence of an operational risk management department. • To determine the direct reporting line of the operational risk management department. • To determine if the CRO serves as a member of the board of directors. • To determine the direct reporting line of the CRO. • To determine the level of agreement on whether the 3LOD risk operating model is utilised in the management of operational risk. • To determine the level of agreement on whether the exact roles and responsibiltities of each line of defence is communicated in the management of operational risk. • To determine the level of agreement on the existence of an independent compliance function. • To determine the level of agreement on the existence of a direct reporting line between the compliance function and the board of directors. • To determine the level of agreement on whether the compliance function advises the board and senior management with regard to complying with

Topic	Rationale
	applicable laws and standards on operational risk management. • To determine the level of agreement on whether the internal audit function performs periodic assessments on the governance framework regarding the management of operational risk. • To determine the level of agreement on whether the internal audit function independently assesses the effectiveness and efficiency of operational risk management. • To determine the level of agreement on whether key points concerning the risk exposures and risk management strategies concerning the management of operational risk is disclosed. • To determine the level of agreement on whether the information concerning risk exposures and risk management strategies is disclosed in such a manner that relevant stakeholders are able to access the information without difficulty. • To determine the level of agreement on whether banks receive regular guidance from the bank supervisor with regard to the governance and management of operational risk. • To obtain information on the types of guidance received from the bank supervisor.
Risk culture with regard to operational risk management	• To determine whether a risk culture exists that encourages communication, collaboration and interaction between the different lines of defence with regard to operational risk management.

Topic	Rationale
	• To determine with whom the responsibility lies to ensure the existence of a risk culture that encourages communication, collaboration and interaction between the different lines of defence with regard to operational risk management. • To determine the level of implementation of a risk culture that encourages communication, collaboration and interaction between the different lines of defence with regard to operational risk management. • To determine how operational risks are communicated throughout the bank. • To identify the most important challenges with a risk culture that currently exists in banks with regard to the management of operational risks.
Supplementary imformation	• To determine if implementation challenges exist with the operational risk management of the Basel III regulatory framework. • To obtain additional information on the types of implementation challenges that exist.

Source: Author (2020).

5.8 Data-analysis procedure

Data analysis is a process that facilitates understanding and enables the researcher to obtain a clear perspective on the collected data (Cooper & Schindler, 2014).

For this study, the SPSS, version 25, was utilised to analyse the collected data (IBM Corp., 2017). Both descriptive and inferential statistical analyses were conducted. This will be further elaborated upon in Sections 5.8.1 and 5.8.2.

5.8.1 Descriptive statistical analyses

A descriptive statistical analysis enables the researcher to obtain an accurate overview and enhanced perspective of the collected data (Kim, 2017; Saunders *et al.*, 2012).

Zikmund *et al.* (2013) defined descriptive statistical analysis as the simple transformation of research data to describe the most prominent characteristics of the collected data. According to Van Zyl (2014), these characteristics can be reported using tabular and graphical illustrations and numerical descriptive statistics, including means, averages and standard deviations.

For this study, descriptive statistics were calculated for both categorical and continuous variables. The categorical variables were presented in frequencies, percentages, pie charts and bar charts. The continuous variables were described by means, standard deviations and histograms. In the next section, inferential statistical analysis is discussed.

5.8.2 Inferential statistical analysis

Inferential statistics are utilised to infer findings according to the characteristics of the sample (Van Zyl, 2014; Pallant, 2020). Inferential statistical analyses were conducted on the collected data to determine if the participants' responses were influenced by: (1) the implementation level of the operational risk management requirements of the Basel III regulatory framework, and (2) the implementation level of a risk culture that supports and encourages the management of operational risk.

When conducting inferential statistical analyses, the corresponding p-value for each test should be considered. The p-value reports the extent to which the test statistics disagree with the null hypothesis (Saunders *et al.*, 2012; Pallant, 2020). Cooper and Schindler (2014) explained that the p-value is the probability of observing a sample value as extreme as, or more extreme than, the value observed, given that the null hypothesis is true. The calculated p-value is then measured against the chosen level of significance, and based on this measurement, the null hypothesis is either accepted or rejected. A test's level of significance is defined as the probability of rejecting the null hypothesis when the null hypothesis is actually true (a decision known as a Type 1 error) (Saunders *et al.*, 2012).

The chosen level of significance for this study was 0.05. For a statistical test to be considered statistically significant, the calculated p-value must be lower or equal to 0.05 ($p \leq 0.05$). For this study, three inferential statistical tests were conducted: the Mann-Whitney U test, Fisher's exact test and multiple regression analysis. These tests are further described in Sections 5.8.2.1 to 5.8.2.3.

5.8.2.1 The Mann-Whitney U test

The Mann-Whitney U test is a non-parametric test for independent samples and is utilised to test for differences between two independent groups on an ordinal measure by comparing the medians of the two independent groups (Cooper & Schindler, 2014; Pallant, 2020). Generally, the Mann-Whitney U test is suitable for statistical analyses from a small sample (Field, 2013). However, the Mann-Whitney U test is appropriate when four assumptions apply (McClenghan, 2022, Pallant, 2020), namely:

- The dependent variable should be measured on an ordinal scale.
- The independent variable should be two independent, categorical groups.
- The observations should be independent.
- When the observations are not normally distributed.

The data gathered for this study complied with all four assumptions as:

- The dependent variables were measured on an ordinal scale (see Section 5.5.8.2).
- Independent variables were divided into two categorical groups (*not implemented* versus *in the process* and *partially implemented* versus *fully implemented*).
- All observations were independent; therefore, no relationship existed as respondents were permitted to form part of only one of the independent categorical groups.
- The observations were not normally distributed.

Consequently, the Mann-Whitney U test was used to determine whether a statistically significant difference existed between the levels of implementation with regard to responses relating to Basel III (*not implemented* versus *in the process*), as well as the level of implementation with regard to responses relating to risk culture (*partially*

implemented versus *fully implemented*). If the p-value of the Mann-Whitney U test was higher than 0.05 (p-value > 0.05), no statistically significant difference existed at the 5% level between the levels of implementation with regard to the specific dependent variable; therefore, the level of implementation did not influence the respondent's responses. However, if the p-value was lower or equal to 0.05 (p-value ≤ 0.05), a statistically significant difference existed between the implementation levels with regard to the responses to the specific question. In order to explore the nature of the statistically significant differences, the median value for each group was reported, as Pallant (2020) recommended. The median was used to describe whether a difference in central tendency existed between the different levels of implementation (*not implemented* versus *in the process* **and** *partially implemented* versus *fully implemented*) and the participants' responses to a specific question. Based on the relative position of the median, it could be construed that the level of implementation (*not implemented* versus *in the process* **and** *partially implemented* versus *fully implemented*) with the highest median, showed a higher level of agreement compared to the alternative implementation level.

Pallant (2020) and Field (2013) furthermore advised that the effect size of each Mann-Whitney U test should be reported. If the absolute r-value is lower or equal to 0.10 ($r \leq 0.10$), the test would be considered to have a small effect size and, therefore, be of low practical importance. If the absolute r-value is higher than 0.1 but lower or equal to 0.30 ($0.10 < r \leq 0.30$), the test would be considered to have a medium effect size and, therefore, be of medium practical importance. If the absolute r-value is higher than 0.30 but lower or equal to 0.50 ($0.30 < r \leq 0.50$), the test would be considered to have a large effect size and, therefore, be of high practical importance (Pallant, 2020; Field, 2013).

5.8.2.2 Fisher's exact test

The Fisher exact test is a non-parametric test used to determine whether a non-random association exists between two categorical variables by calculating the probability of obtaining the observed data under the null hypotheses when the proportions are the same (Bewick, Cheek & Ball, 2003; Kim, 2017; McDonald, 2014; Weinsstein, 2022). In other words, when using the Fisher exact test, the p-value is calculated as if the table's margins are fixed (Weinsstein, 2022).

The Fisher exact test was deemed suitable for this study as this non-parametric test is (Döring, 2018; Lewis & Schoenfeld, 2022; Weinsstein, 2022):

- Best suited for 2x2 contingency tables.
- Deemed more accurate than the chi-square test or the G-test of independence when working with small samples.
- An accurate method of computing the p-value (a multivariate generalisation of the hypergeometric probability function).

The Fisher exact test is furthermore subjected to five assumptions (Horne, 1998; Statstest, 2022), namely:

- The data should be presented in a crosstabulation with two rows and two columns.
- The sample size should be small.
- Observations should be mutually exclusive (no subject can be classified into more than one category).
- The row and column totals should be given (fixed by the study's design).
- At least one cell count should be less than 10.

The data gathered for this study adhered to all the above-mentioned assumptions as:

- All crosstabulations have two rows and two columns (see crosstabulation tables presented in Sections 7.2.1.2 and 7.4).
- The study’s sample size is small (the Fisher exact tests were conducted on the valid responses).
- All observations were mutually exclusive and could not be classified into more than one category. For the level of implementation of the operational risk management requirements, the observations were grouped into *not implemented* versus *in the process.* For the utilisation of operational risk management tools to identify and assess operational risk, the observations were grouped into *yes* versus *no,* and for the level of implementation of a risk culture that encourages and support operational risk management, the observations were grouped into *partially implemented* versus *fully implemented.*

- The row and column totals are given in the crosstabulations (see tables in Sections 7.2.1.2 and 7.4).
- At least one cell count is less than ten in the crosstabulation (see tables in Sections 7.2.1.2 and 7.4).

The Fisher exact test met all the assumptions on which the distribution of the test statistics was defined, indicating that the false rejection rate was equal to the significance level of the test (Döring, 2018; Horne, 1998; Statstest, 2022).

5.8.2.3 Regression analysis

Regression analysis is a collective term for methods that can be utilised to model and analyse numerical data comprising values of a dependent variable (also referred to as a response variable) and one or more independent variables (also referred to as predictors). A dependent variable is described as a measured variable dependent on the independent variables' behaviour; while independent variables directly influence the dependent variable and cannot be controlled in an experiment (Albright, Winston, Zappe & Broadie, 2011; Pallant, 2021).

Multiple regression analysis was utilised for this study to model the relationship between a continuous dependent variable and several independent variables, which were either categorical or continuous. Two of the independent variables were dummy-coded to enable the multiple regression analysis to be conducted in this study. This was done as dummy variables enable the use of a single regression equation to represent multiple groups (Field, 2013; Pallant, 2021).

The categorical independent variables that were dummy-coded included:

- The level of implementation of the operational risk management requirements of Basel III (BS). This categorical variable was dummy-coded to comprise only two categories: *not implemented* and *in the process*.
- The level of implementation of a risk culture that encourages and supports operational risk management (RC). This categorical variable was also dummy-coded so that it comprised the two categories: *partially implemented* and *fully implemented*.

For multiple regression analysis to be conducted, four assumptions should be tested for and met (Schindler, 2019; Tabachnick & Fidell, 2001; Pallant, 2021). These assumptions were tested and adhered to in the following manner:

- Residuals should be normally distributed

  Although Univariate normality is not an assumption of multiple regression, regression assumes that the residual values are more or less normally distributed. Outliers were therefore identified and removed from the multiple regression analysis by visually inspecting histograms and calculating the standardised residuals − which should not have an absolute value greater than 3.29 (Schindler, 2019; Tabachnick & Fidell, 2001; Pallant, 2021).
- Linearity

  Multiple regression can only accurately estimate the relationship between independent and dependent variables if the relationships between these variables are approximately linear. The linearity of the relationships was investigated through the inspection and examination of the probability plot (P-P plot) of standardised residuals. If the plotted points follow the fitted line closely, this assumption is appropriately met (Schindler, 2019; Tabachnick & Fidell, 2001; Pallant, 2021).
- Independence of residuals

  The Durbin-Watson statistic was calculated for each multiple regression analysis to test the independence of residuals. As a rule of thumb, this value should be close to two; if this value is below one or over three, it suggests that the errors are dependent and the assumption cannot be met (Schindler, 2019; Tabachnick & Fidell, 2001).
- Multicollinearity

  Multicollinearity refers to the relationship among independent variables. Multicollinearity exists when the independent variables are highly correlated and are assessed by the variance inflation factor (VIF) and the tolerance statistic. The VIF should not be greater than five and the tolerance statistic not below 0.20 for this assumption to be met (Field, 2013; Pallant, 2021).

- Homoscedasticity

  Homoscedasticity is achieved when the variance of errors is the same across all levels of the independent variable. Homoscedasticity was assessed by examining and comparing the scatter plot of standardised residuals with the standardised predicted values. For this assumption to be met, no distich pattern should exist between the data points portrayed by the scatter plot, with no prominent outliers (Schindler, 2019; Tabachnick & Fidell, 2001; Pallant, 2021).

Before conducting the multiple regression analysis, all assumptions were tested and met (see Chapter 7, Section 7.5). The multiple regression analysis provided an indication of the percentage of variance in the dependent variable that is explained by the independent variables combined, as well as the significance of each individual independent variable (Cooper & Schindler, 2014; Pallant, 2021; Saunders *et al.,* 2012; Williams *et al.*, 2012).

The analyses of the three multiple regressions conducted for this study, included:

- The first multiple regression investigated whether the total number of operational risk management tools utilised (OP) by the surveyed Ghanaian banks and their level of implementation of the operational risk management requirements of Basel III (BS) could predict the level of agreement on the perceived benefit of operational risk management (PB).

  Model 1: $PB = \beta_0 + \beta_1(BS) + \beta_2(OP)$

- The second multiple regression investigated whether the level of implementation of the operational risk management requirements of Basel III (BS) and the level of implementation of a risk culture that encourages and supports operational risk management (RC) at the surveyed banks could predict the level of agreement on the perceived benefit of operational risk management (PB).

  Model 2: $PB = \beta_0 + \beta_1(RC) + \beta_2(BS)$

- The third multiple regression investigated whether the level of implementation of the operational risk management requirements of Basel III (BS) and the level of implementation of a risk culture that encourages and supports operational risk

management (RC) at the surveyed banks could predict the disclosure and transparency of operational risk management information (DT).

Model 3: $DT = \beta_0 + \beta_1(BS) + \beta_2(RC)$

5.9 Ethical considerations

In the context of research, ethics refer to standards of behaviour that guide the researcher's conduct concerning the rights of those parties who become the subjects of the researcher's work or who are affected by it (Saunders *et al.*, 2012). Van der Wal (2006) argued that researchers must do everything in their power to protect the physical, social and psychological welfare of those being studied and to honour their dignity and privacy.

The ultimate objective of research ethics is to protect the participants. This entails that participants are not harmed and do not suffer any adverse effects from the research activities (Saunders *et al.*, 2012; Mutezo, 2015).

Salkind (2012) identified six ethical principles that should be adhered to in order to ensure that a research project is conducted ethically. These six ethical principles, as discussed below, were adhered to during this study.

5.9.1 Protection from harm

In this study, the data-gathering process involved a survey requiring participants to complete a questionnaire. In designing the questionnaire, the researcher devoted special attention to ensuring that no respondent would be offended or suffer psychological harm by engaging with the questionnaire (Salkind, 2012).

5.9.2 Coercion

Coercion is defined as the action or practice of persuading an individual to do something using force or threats (Stevenson, 2010). Participation in the study was voluntary, and no respondent was pressured or forced in any way to participate (Salkind, 2012).

5.9.3 Maintenance of privacy

The maintenance of privacy is essential for two reasons: (1) to ensure the validity of the research and (2) to protect all the respondents. This explicitly applies to anonymity. Anonymity was assured by safeguarding the participants' identities and not disclosing which of the Ghanaian banks employed these individuals (Cooper & Schindler, 2014; Salkind, 2012; Saunders *et al.*, 2015).

Another aspect of ethical research concerns being sensitive to the private space of the participants. This study evaded the issue by the chosen data-collection method. The respondents were free to complete the questionnaire in their own time and at a convenient place (Blumberg, Cooper & Schindler, 2011; Salkind, 2012).

5.9.4 Informed consent

Informed consent involves the nature of the research project and the nature of an individual's participation (Mutezo, 2015). Securing the participants' informed consent involves fully disclosing all procedures before requesting permission to proceed with the study. Furthermore, informed consent requires that participants be assured of their right to withdraw from the study at any time (Cooper & Schindler, 2014). Before the data-collection phase commenced, an informed-consent letter (see Appendix B), in which the nature and purpose of the study were explained, was presented to each participant.

5.9.5 Confidentiality

Confidentiality refers to the right of access to the data provided by the respondents and the need to keep the data safe, private and in a secure, controlled environment. It further refers to the assurance by the researcher not to reveal the participant's identities or to present the findings in a manner that enables respondents to be identified (Cooper & Schindler, 2014; Saunders *et al.*, 2012).

All the data collected from the respondents are safely stored and password-protected on an external hard drive, which is locked in a cabinet at the researcher's private residence. Only the researcher and statistician had access to the data. The statistician was granted

access to the data after the completion of a confidentiality agreement and had access only during the data-analysis phase of the study (Saunders *et al.*, 2012).

5.9.6 Sharing the benefits

Upon completing the research project, the study's findings will be made available to all respondents on request. A summary of the results will be compiled in a research report, which will be sent to participants via email.

The study aims to contribute to the successful implementation of the operational risk management requirements mandated by the Basel III regulatory framework at Ghanaian banks, thus making a meaningful contribution towards improving financial stability and resilience in the Ghanaian banking sector.

In addition to the above ethical principles, the study adhered to the three ethical principles of the Belmont Report: respect for persons, beneficence, and justice (The National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1979).

- Respect for persons involves protecting the independence of all people and treating participants with courtesy and respect as well as agreeing to informed consent.
- Beneficence follows and supports the philosophy of "do no harm". This principle maximises the benefits of the research project and minimises risks to the research subjects.
- Justice ensures reasonable, non-exploitative and prudently considered research procedures (The National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1979; Grebe, 2015).

The proposal for the study was reviewed by the Research Ethics Committee of the College of Economic and Management Sciences at the University of South Africa. Please refer to Appendix C for a copy of the ethical clearance certificate that was obtained prior to commencing with the study.

5.10 Conclusion

Chapter 5 discussed using the research "onion" as a point of departure to conduct the study. A positivistic research paradigm was considered most appropriate, and the researcher decided on a non-experimental descriptive research design to address the research questions and the study's research objectives.

A quantitative research method was utilised, where data were collected from the target population of Ghanaian banks. A questionnaire was utilised as the research instrument, which included closed-ended and open-ended questions to collect the required information from the sample population, which was selected by employing a non-probability sampling technique in the form of purposive sampling. Pre-testing of the questionnaire was done before commencing with the data-collection phase to ensure the reliability and validity of the research instrument.

The analyses of the data included both descriptive and inferential statistical techniques. The descriptive statistical analyses were done for both categorical and continuous variables. The categorical variables were presented in frequencies, percentages, pie charts and bar charts while the continuous variables were described through standard deviations and histograms. The inferential statistical analyses included non-parametric statistical tests in the form of the Mann-Whitney U test and Fisher's exact test, while multiple regression analyses were conducted to model the relationship between certain dependent and independent variables. The study adhered to all the required ethical procedures and considerations to ensure that it was conducted ethically.

The next chapter will focus on the description and analysis of the characteristics of the collected data by using descriptive statistical techniques.

Chapter 6 - Descriptive analysis and results

6.1 Introduction

The research methodology implemented in this study enabled the collection of empirical evidence by exploring both primary and secondary data sources. This chapter will focus on addressing the following secondary research objectives:

- To obtain general information on the respondents and Ghanaian banks (SRO_{12}).
- To investigate the operational risk management practices of Ghanaian banks (SRO_{13}).
- To explore the risk governance practices of Ghanaian banks (SRO_{14}).
- To assess the implementation of a risk culture in Ghanaian banks (SRO_{15}).

6.2 Descriptive statistical analyses and results

This section presents the descriptive statistical analyses and results through graphic illustrations and discussions of the findings.

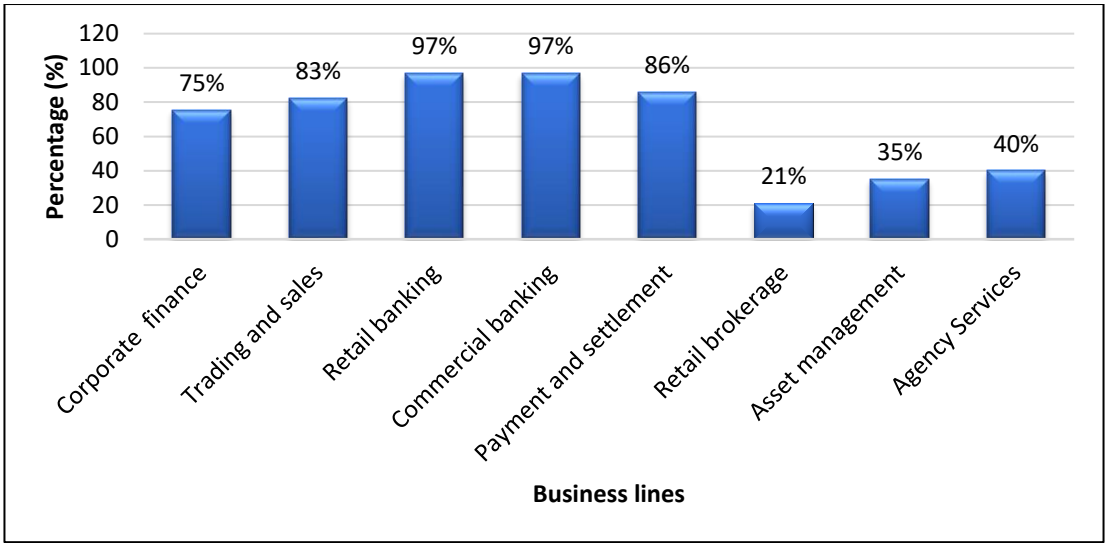
6.2.1 Section 1: General information

Section 1 of the questionnaire consisted of three questions. The purpose of this section was to gain general information on the different business lines offered by banks operating within Ghana. Information was also gathered on the respondents' work experience at a Ghanaian bank and their area of specialisation.

6.2.1.1 Business lines offered by Ghanaian banks

Figure 6.1 presents the business lines offered by the banks represented in the study.

Figure 6.1: Business lines offered



Source: Author (2020).

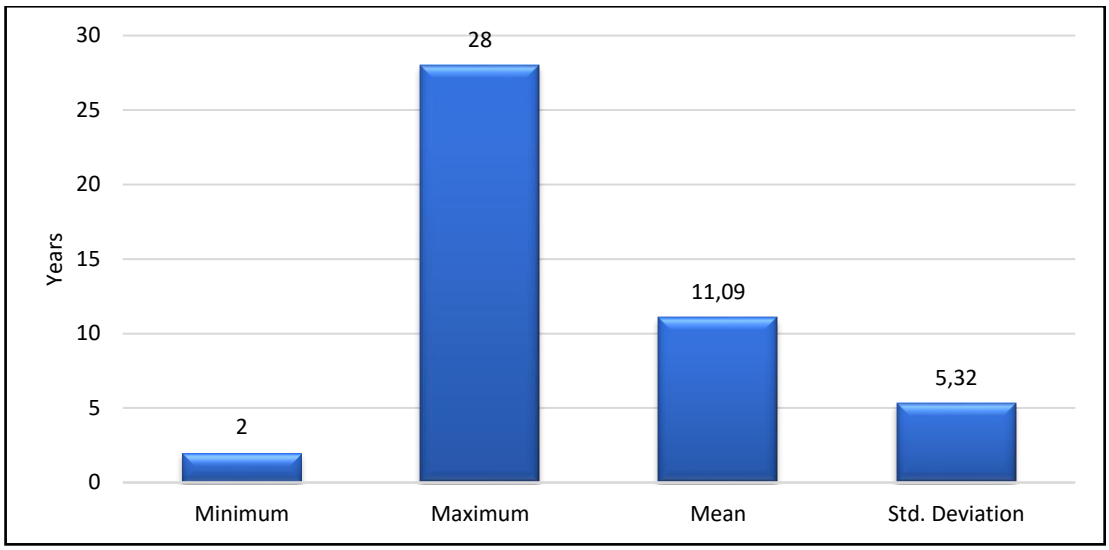
The surveyed Ghanaian banks offer their clients a broad spectrum of business lines, as shown in Figure 6.1. The dominant business lines provided by these banks are: retail banking (97%), commercial banking (97%), payment and settlement services (86%), trading and sales (83%) and corporate finance (75%). The business lines offered with lower frequencies include: agency services (40%), asset management (35%) and retail brokerage (21%).

6.2.1.2 Banking experience of respondents

According to Njogu (2017), employees who have worked in a specific industry for many years have gained significant expertise and knowledge about their organisations' culture, processes, procedures, products and services. These employees have experienced many changes within their working environment and, as a result, have a good understanding of procedures and processes that work effectively in the organisation compared to those that require further improvement. Plouffe and Egoire (2011) agreed with the findings of Njogu (2017) that it is imperative for an organisation to have experienced employees. These individuals have spent significant time and energy obtaining the required skills and knowledge to execute their responsibilities effectively and efficiently − which significantly contributes to accomplishing current and future objectives.

Figure 6.2 provides information on the respondents' experience as employees at the surveyed Ghanaian banks.

Figure 6.2: Experience of respondents



Source: Author (2020).

The years the respondents were employed at Ghanaian banks ranged from a minimum of two years to a maximum of twenty-eight years. The mean value was calculated at 11.09 years, with a standard deviation of 5.32 years.

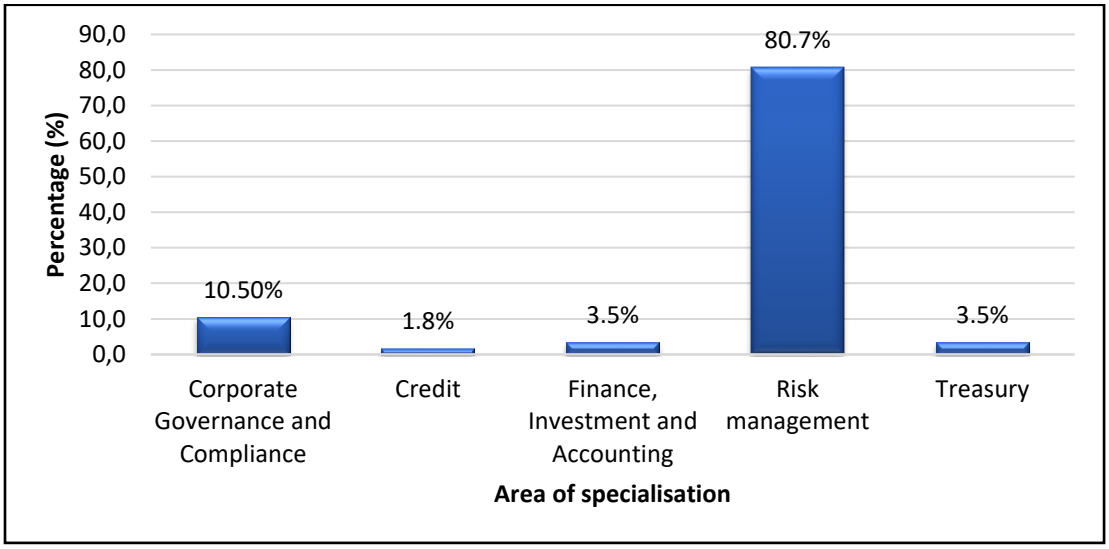
Gladwell (2008) stated that an individual might be deemed knowledgeable within a specific field of work after spending at least 10 000 hours[46] studying or practising within that specific field. Gladwell (2018) based his findings on the research conducted by Ericson, Krampe and Tesch-Romer (1993), which was reaffirmed by research conducted by Macnamara and Maitra (2019). It can, therefore, be concluded, based on the work by Gladwell (2008), Ericson *et al.* (1993) and Macnamara and Maitra (2019), that the respondents are knowledgeable in the field of risk management within their respective banks, and the information provided by them may be held as valid, meaningful and conclusive.

[46] In Ghana, there are, on average, 247 working days per year with the approved working hours per day set at 8 hours. This equates to 1976 working hours per year, which is approximately five years of work experience to obtain 10 000 hours (Quarshie, Koi-Akrofi & Martin-Odoom (2013).

6.2.1.3 Respondents' areas of specialisation

Figure 6.3 shows the different areas of specialisation of the respondents employed at the surveyed Ghanaian banks.

Figure 6.3: Respondents' areas of specialisation



Source: Author (2020).

The majority of respondents were employed in risk management (80.7%) at their respective banks, followed by corporate governance and compliance (10.5%), financial management, investment management and accounting (3.5%), treasury (3.5%) and credit (1.8%).

6.2.2 Section 2: Operational risk management perspectives

Operational risk covers a broad spectrum of risks within the banking sector. These risks include any direct or indirect loss resulting from inadequate or failed internal processes, people, systems, or other external events (BIS, 2006a; BIS, 2011c; Young, 2014).

The importance of managing operational risk has also grown significantly over the past decade owing to substantial losses incurred in the financial sector due to the failure to manage this vital risk category effectively. The careful identification, measurement, monitoring, reporting and disclosure of operational risk is critical for banking institutions (Dutta & Perry, 2007; Modiha, 2012).

In the sub-sections that follow, specific aspects of operational risk in the surveyed Ghanaian banks will be discussed: (1) the implementation status of the operational risk management requirement of the Basel regulatory frameworks, (2) the utilisation of operational risk management tools, (3) the monitoring of operational risk, (4) the reporting of operational risk, (5) the disclosure of operational risk, and (6) the value of operational risk management.

6.2.2.1 Implementation status of the Basel regulatory frameworks' requirements regarding operational risk management

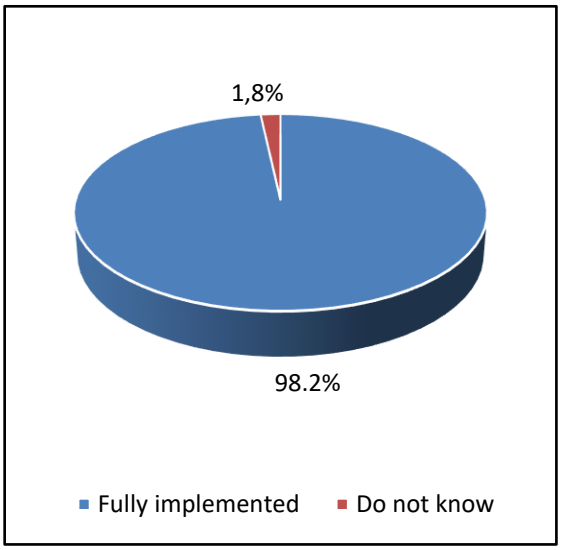
The BIS anticipated that implementation challenges would result from the limited availability of HQLA in developing economies and the difficulties in calibrating a framework to suit the practices of less sophisticated and smaller banks in developing jurisdictions (BIS, 2014b; Tsamela, 2016).

Blundell-Wignall, Atkinson and Roulet (2014) supported this view by stating that the Basel regulatory frameworks add substantial complexity without considering the business models of the banks to which they apply. A one-size-fits-all approach to implementing the Basel regulatory frameworks' requirements concerning operational risk management will not be successful. The difference in banks' governance structures, risk culture, risk management processes, IT processes and management information systems are too substantial (Gottschalk, 2007; Härle *et al.*, 2010). Nyantakyi and Sy (2015) stated that the banking sectors in Africa are much shallower and less penetrated than other major regions in the world. Most regulatory and supervisory authorities in Africa still use the Basel I regulatory framework, which does not address operational risk management. The capacity and governance of banks in emerging and developing economies may hinder the proper implementation of the Basel II and III regulatory frameworks, thereby lessening their effectiveness (Nyantakyi & Sy, 2015; Griffith-Jones & Gottschalk, 2016; Tsamela, 2016; Veron, 2014; Power, 2005a).

Based on the above findings, it was essential to determine the Basel implementation status of Ghanaian banks regarding the effective management of operational risk. Information on the implementation status of the Basel regulatory frameworks' operational

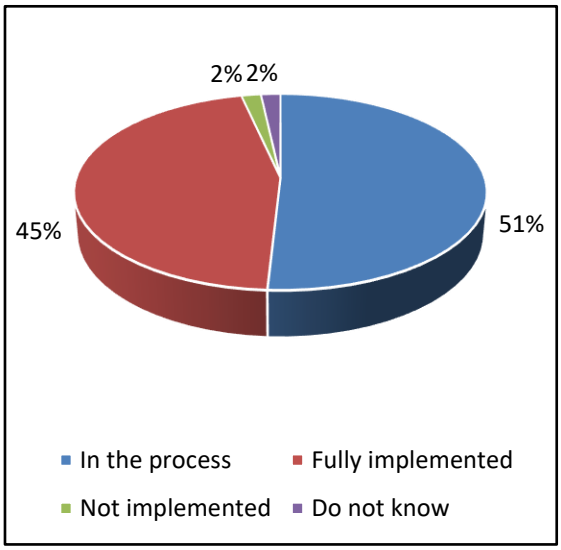
risk management requirements was necessary in order to answer the primary and secondary research questions. Figures 6.4, 6.5 and 6.6 illustrate the implementation status of the surveyed Ghanaian banks concerning the Basel I-, Basel II- and Basel III regulatory frameworks with regard to the management of operational risk.

Figure 6.4: Basel I



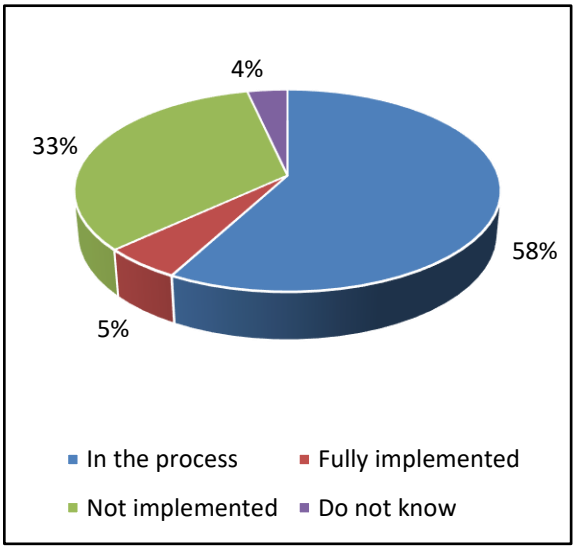
Source: Author (2020).

Figure 6.5: Basel II



Source: Author (2020).

Figure 6.6: Basel III



Source: Author (2020).

Figure 6.4 illustrates that 98.2% of the respondents indicated that their respective banks have fully implemented the operational risk management requirements of Basel I, leaving 1.8% not knowing what the level of implementation of their banks is.

Figure 6.5 illustrates that 45% of the respondents reported that their respective banks have fully implemented the Basel II requirements with regard to the management of operational risk, and 51% indicated that their banks are in the process of implementing the requirements. Two per cent (2%) indicated that their banks have yet to begin to implement these requirements. The remaining 2% noted that they did not know what the implementation status of their banks is.

The implementation status of the Basel III regulatory framework requirements on operational risk management is demonstrated in Figure 6.6. It illustrates that only 5% of the respondents reported that their respective banks have fully implemented the Basel III regulatory framework's requirements. Fifty-eight per cent (58%) of the respondents specified that their banks are in the process of implementing the relevant requirements, with an additional 33% indicating that their banks have not yet started the implementation process. A final 4% did not know what their banks' level of implementation of the Basel III requirements is with regard to the management of operational risk.

6.2.2.2 Operational risk management tools

The identification and assessment of operational risk are fundamental processes in a banking institutions' overall operational risk management system (De Cos, 2020; BIS, 2011c; BIS, 2002b).

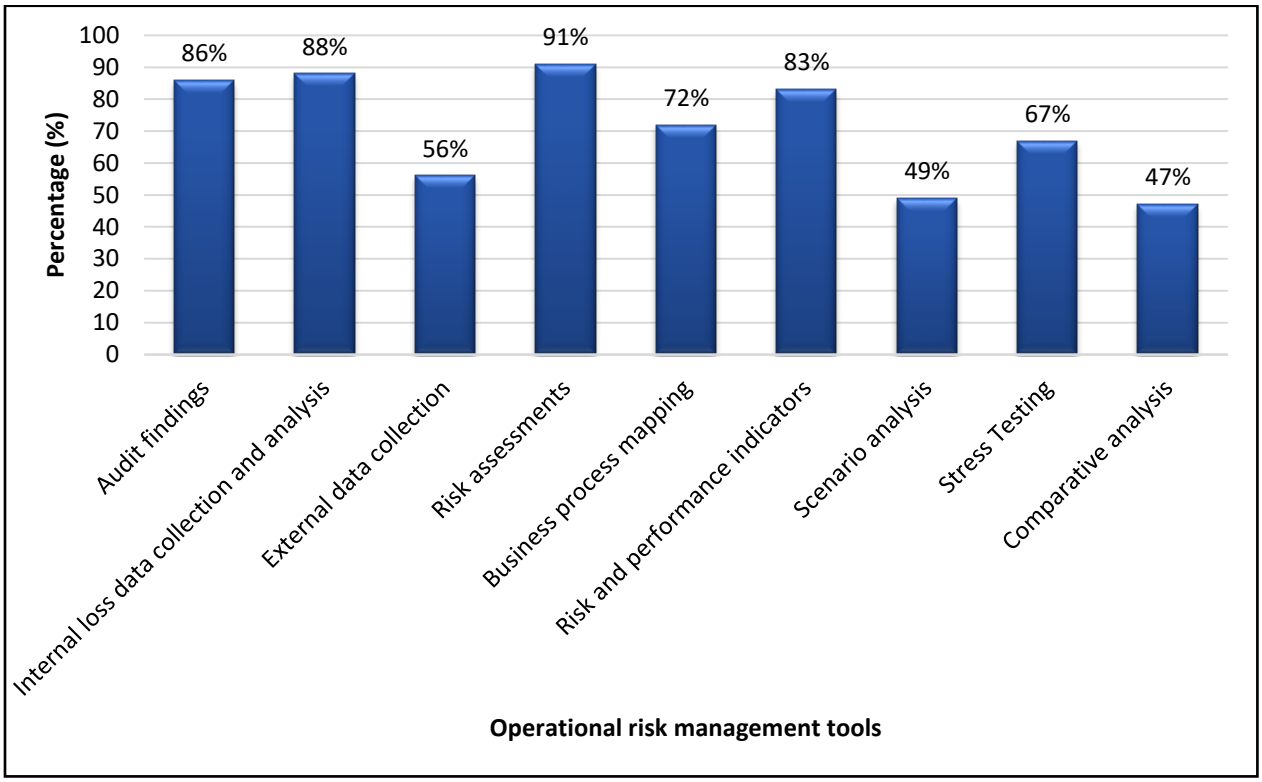
The correct risk identification and assessment methods are crucial within the banking sector. It allows banks to understand their risk profile better, leading to the effective allocation of risk management resources and the formulation of appropriate risk management strategies. Failure to do so can result in the misstatement of a bank's risk-and-return profile and expose a bank to significant operational losses, jeopardising the bank's objective to achieve financial stability and resilience (De Cos, 2020; BIS, 2002b; BIS, 2011a).

The BCBS (through the establishment of the Basel II- and Basel III regulatory frameworks) recommended that banks continually create board-approved risk methodologies within their operational risk management practices. These methodologies should define how operational risk management tools are implemented and embedded

within their business processes. These tools include: audit findings, internal loss data collection and analysis, external data collection and analysis, risk assessments, business process mapping, risk and performance indicators, scenario analysis, and measurement and comparative analysis (BIS, 2002b; BIS, 2006a; BIS, 2011a; Modiha, 2012).

Therefore, this part of the questionnaire was to determine the extent to which Ghanaian banks utilised these operational risk management tools as prescribed by the Basel II- and Basel III regulatory frameworks.

Figure 6.7: Operational risk management tools utilised by the surveyed Ghanaian banks



Source: Author (2020).

Figure 6.7 shows that represented banks utilise a broad spectrum of operational risk management tools to identify and assess operational risk.

The operational risk management tools most frequently utilised by the surveyed Ghanaian banks are risk assessments (91%), internal loss data collection and analysis (88%), audit findings (86%), risk and performance indicators (83%), business process mapping (72%)

and stress testing (67%). The tools less frequently utilised are external data collection (56%), scenario analysis (49%) and comparative analysis (47%).

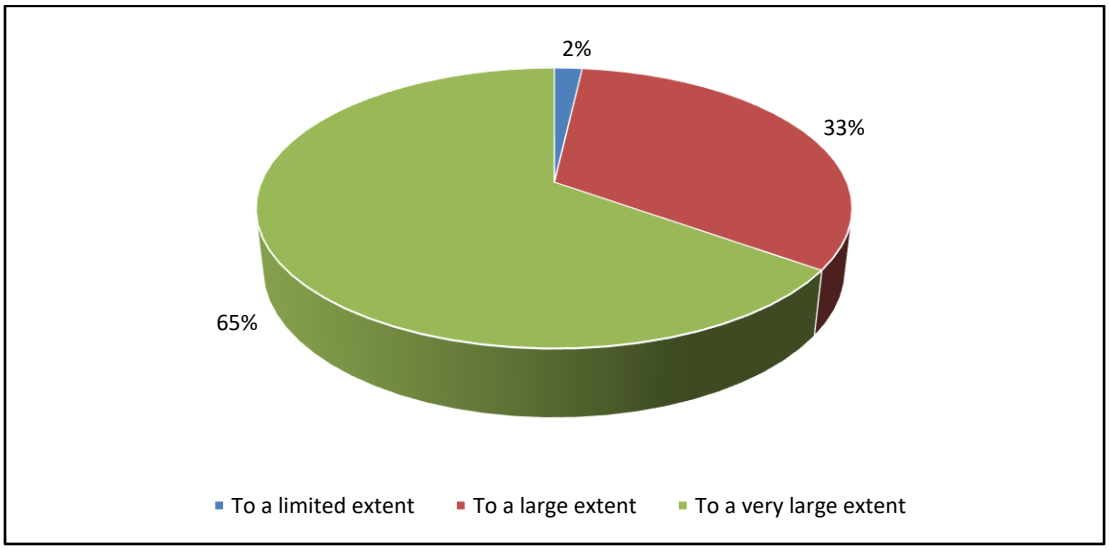
6.2.2.3 The monitoring of operational risks

The 2007-2008 GFC emphasised the importance of banks' effective monitoring and reporting activities and transparency regarding their business operations. Through monitoring and reporting, market participants can gain an improved understanding of a bank's current risk profile. As a result, market uncertainties are reduced regarding banks' financial stability and resilience (De Cos, 2020; BIS, 2011c).

Croitoru (2014) emphasised that monitoring operational risk requires establishing the threshold levels of operational risk events within the organisation's risk management framework. Banks should ensure that sufficient information flows both vertically (between different levels in the bank) and horizontally (between functional units in the bank) to allow these threshold levels to be effectively communicated throughout the bank. The bank's senior management is tasked with implementing a process that monitors operational risks and material exposures to losses (BIS, 2004).

In this instance, the study aimed to determine the extent to which Ghanaian banks monitor operational risks, as illustrated in Figure 6.8.

Figure 6.8: The monitoring of operational risks by the surveyed Ghanaian banks



Source: Author (2020).

Sixty-five per cent (65%) of respondents indicated that operational risks are monitored to a very large extent, while 33% reported that operational risks are monitored to a large extent. Only 2% of respondents indicated that operational risks are monitored to a limited extent.

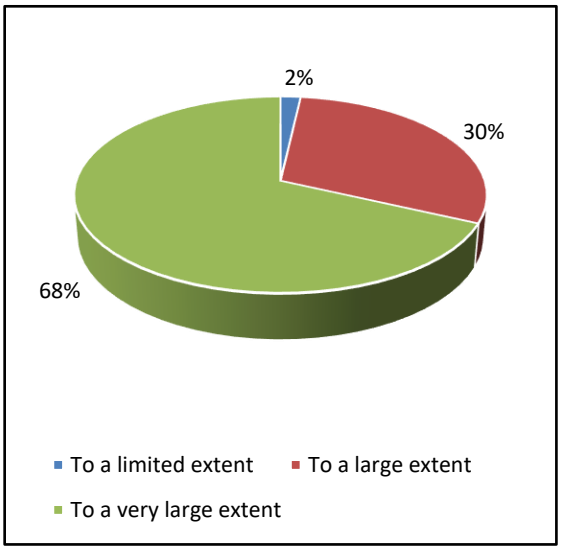
6.2.2.4 The reporting of operational risks

Operational risk reporting involves the following: the communication of operational risk events, trends of losses incurred, key operational risk indicators, external news of events worthy of monitoring, the status of major projects that impact the risk profile of a bank, and the capital levels maintained to cover operational risk losses. The key objective in reporting these risks is to communicate the overall risk profile of operational risk events across the different business lines of a bank (Fernandes, 2020; Haubenstock, 2001).

Banks should continuously strive to improve operational risk reporting. The operational risk reports should be comprehensive, consistent, timely, accurate and manageable in scope and time, as excessive amounts of raw data may hinder effective decision-making. Banks should also produce operational risk reports in normal and stressed market conditions. The results of these reports should be included in the regular board of directors' and senior management's reports (De Cos, 2020; BIS, 2011c).

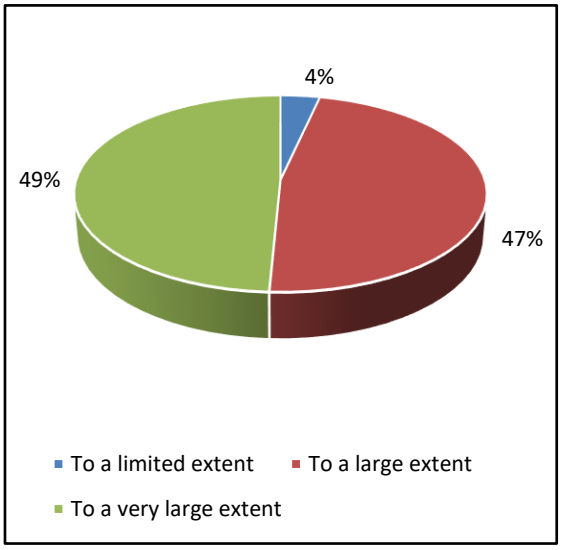
The Basel II- and Basel III regulatory frameworks clearly state that appropriate reporting mechanisms that support the proactive management of operational risks should be established at board-, senior management- and business-line levels of banks (De Cos, 2020; BIS, 2014b). The results of the current operational risk reporting activities by the surveyed Ghanaian banks are presented in Figures 6.9, 6.10 and 6.11.

Figure 6.9: Reporting mechanisms at board level



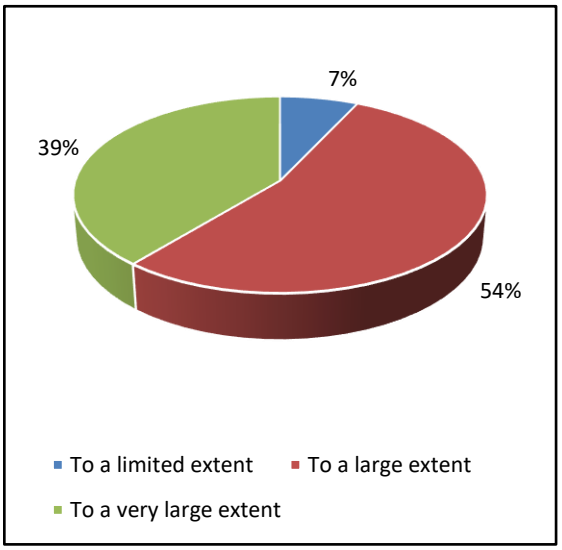
Source: Author (2020).

Figure 6.10: Reporting mechanisms at senior management level



Source: Author (2020).

Figure 6.11: Reporting mechanisms at the business-line level



Source: Author (2020).

Figure 6.9 illustrates that 68% of the respondents indicated that reporting mechanisms are largely in place at board level, which supports the proactive management of operational risk. Thirty per cent (30%) indicated that these reporting mechanisms are in place to a large extent at their banks, with only 2% of the respondents indicating that operational risk reporting mechanisms are in place to a limited extent.

Figure 6.10 shows that 49% of the respondents indicated that reporting mechanisms at senior management level are in place to a very large extent. Forty-seven per cent (47%) stated that these reporting mechanisms are in place to a large extent, with 4% indicating that operational risk reporting mechanisms are in place to a limited extent at their banks.

In Figure 6.11, it is illustrated that 39% of respondents believed that at the business-line level, reporting mechanisms are in place to a very large extent. A further 54% indicated that at their banks, these reporting mechanisms are in place to a large extent, and 7% stated that operational risk reporting mechanisms are in place to a limited extent.

6.2.2.5 The disclosure of operational risks

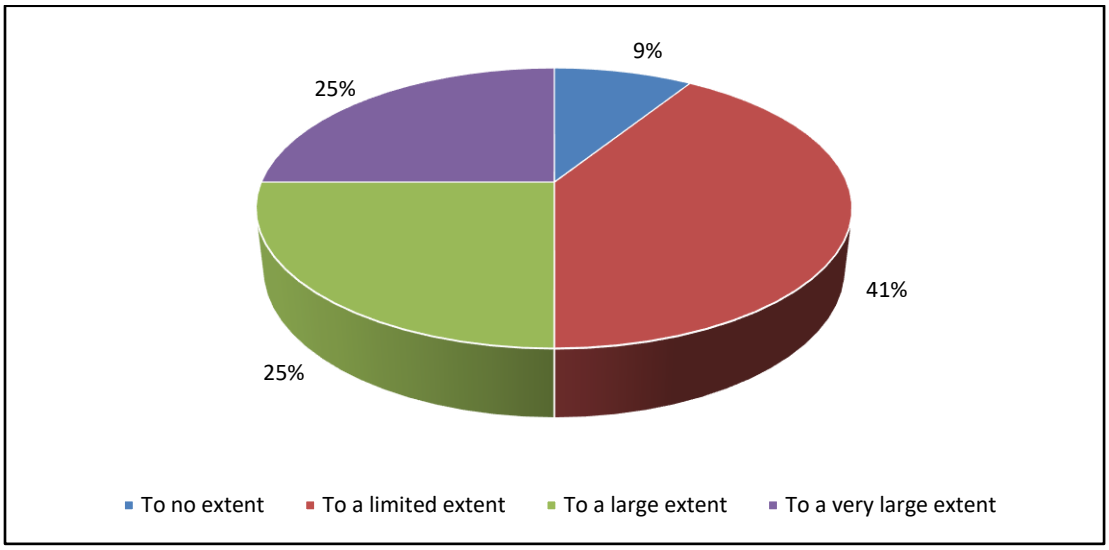
Pillar 3 of the Basel II- and Basel III regulatory frameworks strives to promote market discipline through regulatory disclosure requirements. These disclosure requirements enable stakeholders to access important information about a bank's risk exposures and thus increase the transparency and confidence concerning a bank's exposure to risks and the overall effectiveness of its risk management processes (De Cos, 2020).

The BCBS noted that timely and frequent public disclosure of banks' relevant operational risk management information might improve market discipline and contribute to a more effective operational risk management system (BIS, 2011c; De Cos, 2020).

The disclosure of operational risk management information needs to remain consistent over time to enable relevant stakeholders to identify trends in a bank's overall operational risk profile. The amount of information disclosed should correspond to a bank's size and the complexity of its operations (De Cos, 2020; BIS, 2011c).

The public disclosure of operational risk management information by the surveyed Ghanaian banks to allow stakeholders to assess a bank's approach to operational risk management is presented in Figure 6.12.

Figure 6.12: The disclosure of operational risk management information by Ghanaian banks surveyed



Source: Author (2020).

Figure 6.12 shows that 25% of the respondents agreed to a very large extent that the public disclosure of operational risk management information enables stakeholders to assess a bank's willingness to disclose their operational risk management information. Twenty-five per cent (25%) agreed with this statement to a large extent, whereas 41% agreed to a limited extent. A final 9% of the respondents agreed to no extent.

6.2.2.6 The value of operational risk management

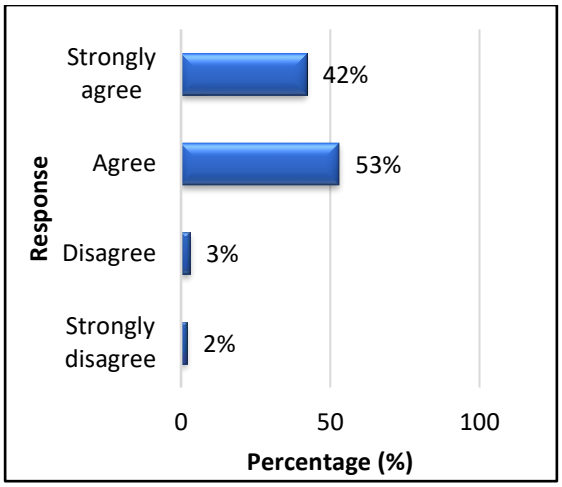
Effective operational risk management has become a key component in achieving a competitive advantage for banks (Eceiza *et al*., 2020; Falih *et al*., 2020). Investors search for indicators demonstrating high-quality risk management practices that point to corporate quality and sustainable financial performance. The multiple benefits of successful operational risk management include: improved access to capital, reduced volatility in cash flow, improved credit ratings, and growth in share prices (Falih *et al.*, 2020; Gadzo *et al.*, 2019; Koomson, 2011; Radomska, 2014).

Consequently, a bank's management team should ensure that operational risk management functions effectively to avoid any unnecessary losses. Effective operational

risk management will ultimately serve as a competitive advantage for banks (Koomson, 2011; Radomska, 2014).

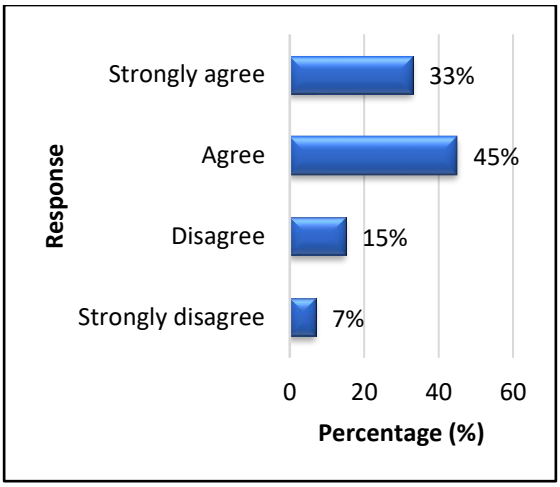
The respondents' views on the benefits of operational risk for their banks are presented in Figures 6.13 to 6.14, which include freeing up capital, lowering profit and loss volatility, and serving as a competitive advantage.

Figure 6.13: Freeing up capital



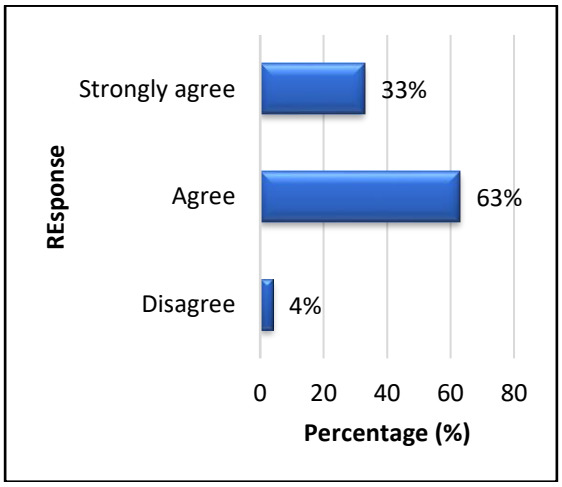
Source: Author (2020).

Figure 6.14: Lowers profit and loss volatility



Source: Author (2020).

Figure 6.15: Competitive advantage



Source: Author (2020).

Figure 6.13 shows that 42% of the respondents strongly agreed, 53% agreed, 3% disagreed, and 2% strongly disagreed that the effective management of operational risk assists their banks in freeing up capital, which can be utilised in other business units of the bank.

Figure 6.14 indicates that 33% of the respondents strongly agreed, 45% agreed, 15% disagreed, and only 7% strongly disagreed that effective operational risk management lowers profit and loss volatility at their banks.

Figure 6.15 illustrates that 33% of the respondents strongly agreed, 63% agreed, and a final 4% disagreed that the effective management of operational risk is regarded as a competitive advantage at their banks.

6.2.3 Section 3: The governance of operational risk

Risk governance can be described as the framework within which risk management functions in an organisation. The BCBS stated that sound internal governance forms the foundation for an effective and efficient operational risk management framework (De Cos, 2020; BIS, 2011c; Luburić, 2017). Asif (2019) supported this view by concluding that risk governance is essential for effective operational risk management and, therefore, a key component in a bank's objective of ensuring financial stability and -resilience.

Banks are advised to develop, implement, and maintain a robust governance structure with well-defined, transparent, and consistent lines of responsibility. The successful functioning of operational risk management requires the active involvement of all staff members. For this reason, each member of the organisation needs to be aware of their respective risk roles and responsibilities as well as those with whom they are working (De Cos, 2020; BIS, 2011c).

In the sub-sections that follow, specific aspects concerning the governance of operational risk will be discussed: (1) the existence of operational risk management departments (2) the direct reporting line of the operational risk management department, (3) the role and line of reporting of the CRO, (4) information on the 3LOD, (5) information on the compliance function, (6) information on the internal audit function, (7) the disclosure of

operational risk management information, and (8) information on the supervisory guidance provided by the bank supervisor.

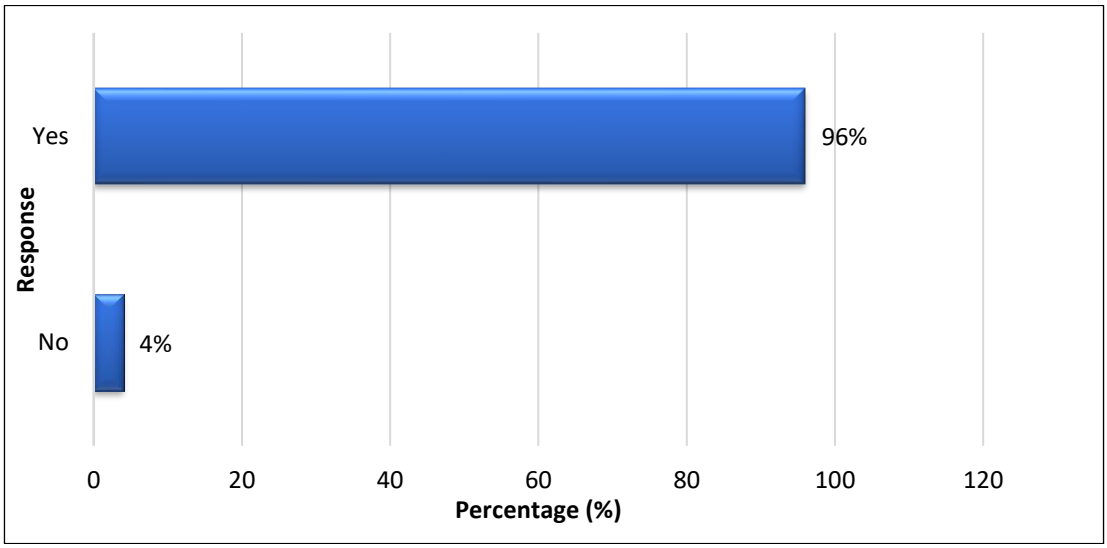
6.2.3.1 Operational risk management department

The operational risk management department can only be effective if it has a holistic view of the operational risk profile of the entire bank. This department should function under the direction of the CRO and have sufficient stature, resources and independence (Muehlenbrock, Messini & Segui, 2012; BIS, 2012a).

The operational risk management department should ideally be positioned within the bank's second line of defence, with the additional role of supporting the different business lines in their respective operational risk management activities. It should have direct access to the board of directors and play an essential role in the bank's maintenance and continual development of operational risk management (De Cos, 2020; BIS, 2011a; Rosenberg, 2016).

Figure 6.16 illustrates the current existence of operational risk management departments in the surveyed Ghanaian banks.

Figure 6.16: The existence of operational risk management departments



Source: Author (2020).

Figure 6.16 illustrates that the majority (96%) of respondents indicated that an operational risk management department exists at their respective banks. A small percentage (4%) of respondents stated that their banks do not have such a department.

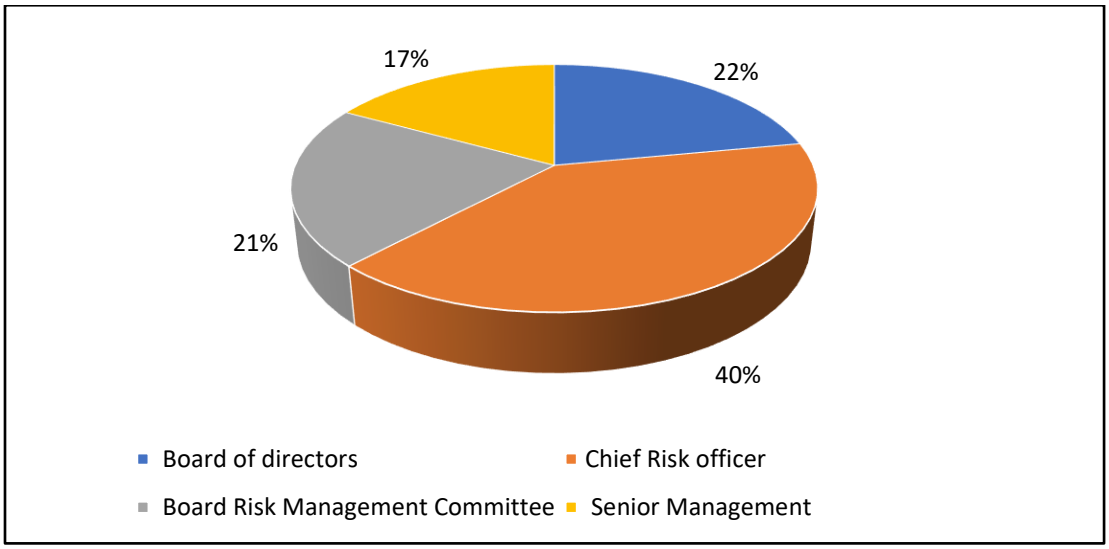
6.2.3.2 The direct reporting line of the operational risk department

The BCBS stated that operational risk reporting should be dynamic, comprehensive and precise. It recommended that effective reporting mechanisms be established at board-, senior management-, and business-line levels, as this will ensure the proactive management of operational risks (BIS, 2014b; De Cos, 2020).

The guidelines prescribed by the Basel III regulatory framework recommend that the operational risk department of banks should ideally report to the CRO, who then has the responsibility to present the information to the board of directors (BIS, 2014d; De Cos, 2020; Pepi, 2019).

The current reporting lines in the operational risk departments are illustrated in Figure 6.17.

Figure 6.17: The direct reporting lines of the operational risk departments



Source: Author (2020).

For this question in the questionnaire, the respondents were able to select more than one option. Figure 6.17 demonstrates that 40% of the respondents indicated that the operational risk department reports to the CRO, whereas 22% specified that the

operational risk department reports to the board of directors. Twenty-one per cent (21%) of the respondents said that the operational risk department reports to the board risk management committee, with a final 17% indicating that the operational risk department reports to senior management.

6.2.3.3 The chief risk officer (CRO)

The Basel III regulatory framework prescribes that banks and other financial institutions appoint a senior executive tasked with: (1) overseeing the overall development and implementation of the organisation's risk management function, and (2) formulating and overseeing the organisation's risk governance strategy. This executive is generally referred to as the chief risk officer (Al-Farsi, 2020; BIS, 2014b; De Cos, 2020; Brown, 2011; Scherbina *et al.*, 2013).

The CRO should be independent and have specific tasks and responsibilities distinct from other executive functions. This requires the CRO to have access to all information they need to perform their duties effectively. The CRO should have unhindered access and a direct line to the board of directors for reporting purposes. It is also essential that the interaction between the CRO and the board of directors occur regularly. The CRO should have the authority to meet with the board without the executive directors being present (BIS, 2014b; Donnelly, 2011; Scherbina *et al.*, 2013).

Best practice requires that the CRO be a member of a bank's executive board, report to the CEO, and possibly the board of directors (IFC, 2015). According to Scherbina *et al.* (2013), it will benefit a bank if the CRO is a member of the board of directors. This will aid in further developing and implementing a bank's risk governance strategy.

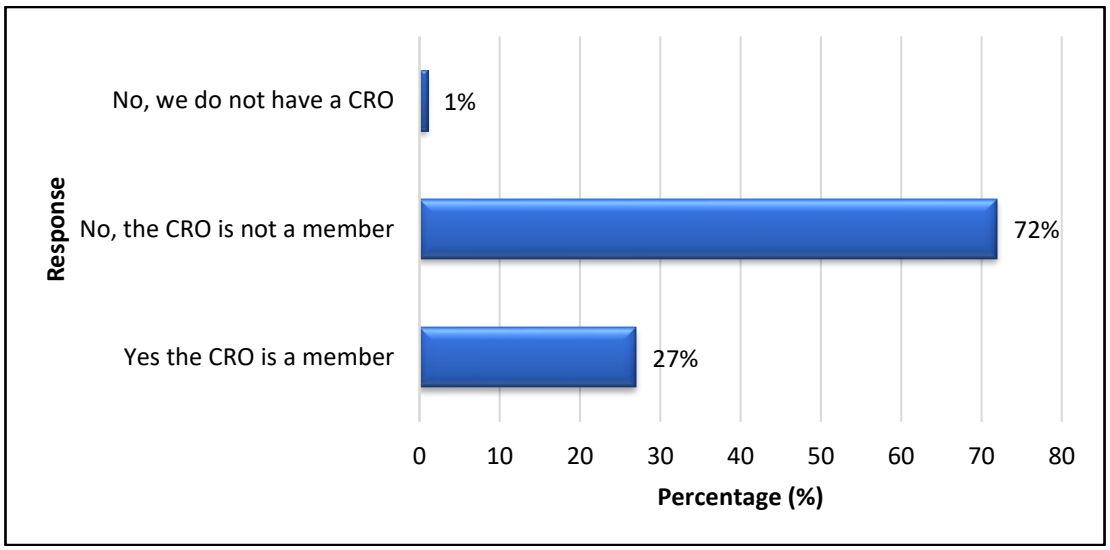
However, Van Deventer (2009) believed that the conventional organisational reporting structure, where the CRO reports directly to the CEO, needs to be revised because the CRO and CEO may have different perspectives on risk and profit generation.

Aebi *et al.* (2011) also found that during a financial crisis (such as the 2007-2008 GFC), banks, where the CRO reported directly to the board of directors, performed significantly better than banks where the CRO reported to the CEO. The BIS also advised that the CRO not assume any management or financial responsibilities for a bank's business lines

or profit-generating functions. This will create a conflict of interest, affecting the CRO's ability to execute their responsibilities successfully (BIS, 2014b; Brown, 2011).

Considering the views expressed above, Figures 6.18 and 6.19 illustrate the situation in the surveyed Ghanaian banks regarding the CRO's authority and line of reporting.

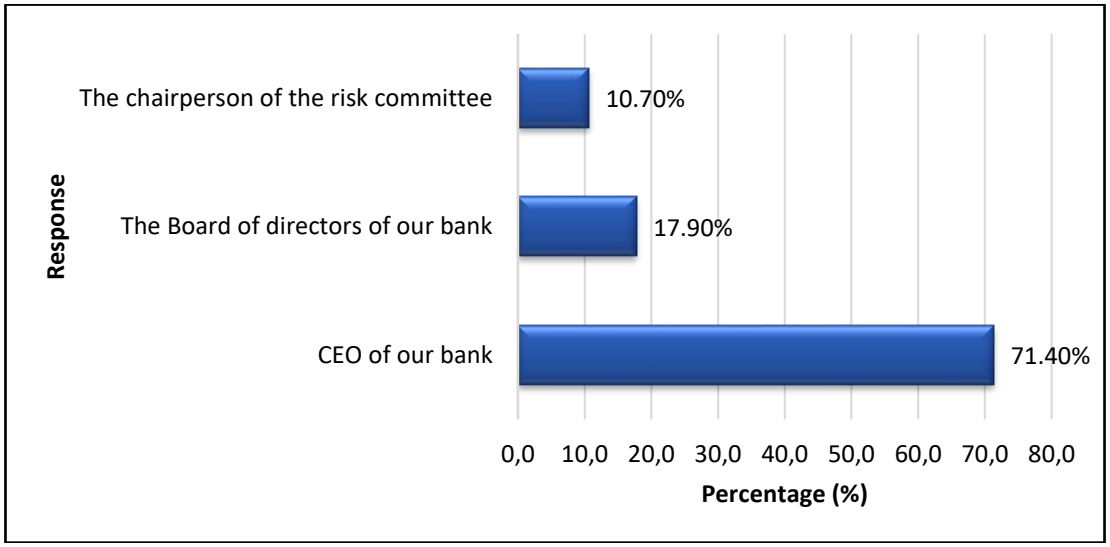
Figure 6.18: CRO membership of the board



Source: Author (2020).

Figure 6.18 illustrates that 72% of the respondents indicated that the CRO is not a member of the board of directors, whereas 27% indicated that the CRO is a member of the board of directors. Only 1% of the respondents reported no formally appointed CRO at their banks.

Figure 6.19: Direct reporting line of the CRO



Source: Author (2020).

For this question in the questionnaire, the respondents were required to select only one option. Figure 6.19 shows that 71.4% of the respondents stated that the CRO reports directly to the CEO, whereas 17.9% specified that the CRO reports directly to the board of directors. A final 10.7% indicated that the CRO reports directly to the chairperson of the risk committee.

6.2.3.4 Three lines of defence (3LOD) risk operating model

The BIS advised banks to utilise the 3LOD risk operating model, as this model will assist banks in identifying and managing operational risk more effectively (BIS, 2014b).

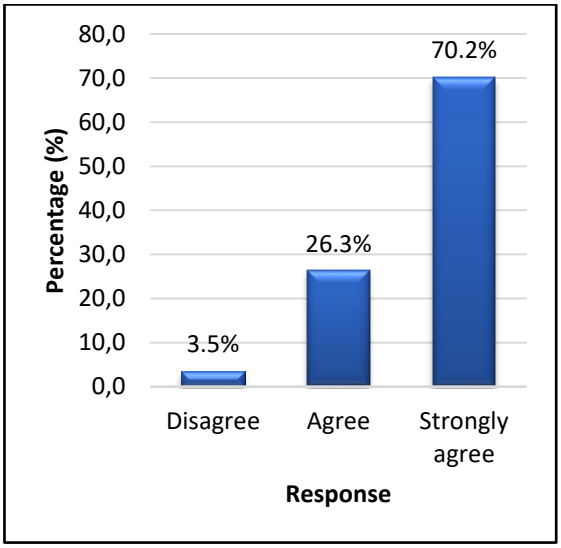
The 3LOD model enhances the understanding of risk management and control by clarifying the exact roles and responsibilities of the respective parties in the organisation, which allows for effective, independent risk oversight and escalation. The 3LOD should be separated in the organisation, each with its unique roles and responsibilities, and supported by a consistent "tone from the top". The correct implementation of the model will promote and enable the effective management of operational risk and control (Freeman, 2018; Rosenberg, 2016). Freeman (2018) rightfully pointed out that when the 3LOD is correctly structured and established, banks will reap the benefits of a more

efficient and effective operational risk management function with no breaches in coverage.

Luburić (2016) also believed that the successful implementation of the 3LOD model within the banking sector depends primarily on the active involvement and support from senior management and the board of directors. Therefore, a strong risk governance structure, with good communication among the 3LOD, is imperative (BIS, 2011a).

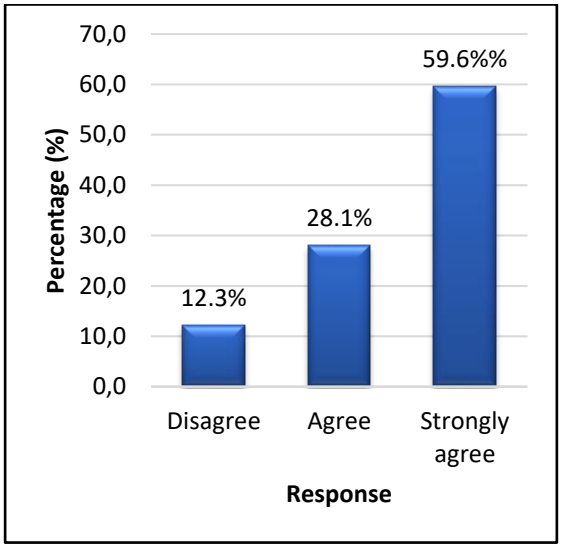
Figures 6.20 and 6.21 illustrate participants' perspectives on the importance of the 3LOD model in managing operational risk.

Figure 6.20: The utilisation of 3LOD model



Source: Author (2020).

Figure 6.21: The communication of the exact roles and responsibilities



Source: Author (2020).

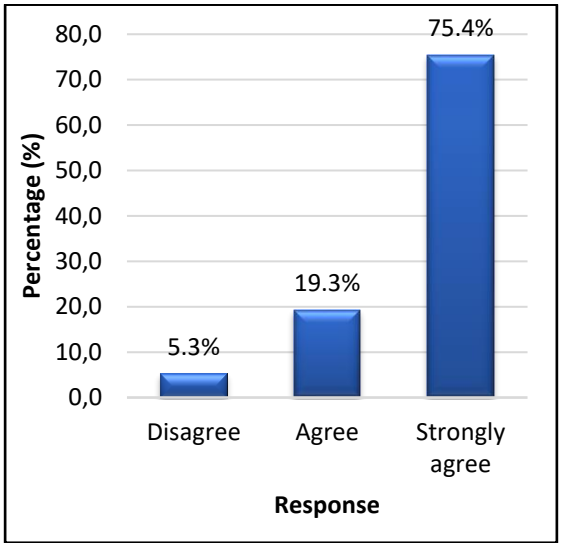
Figure 6.20 shows that 70.2% of the respondents strongly agreed, 26.3% agreed, and only 3.5% disagreed that their respective banks utilise the 3LOD model regarding operational risk management.

Figure 6.21 illustrates that 59.6% of the respondents strongly agreed, 28.1% agreed, and 12.3% disagreed that the exact roles and responsibilities of each line of defence are communicated at their respective banks regarding the management of operational risk.

6.2.3.5 Compliance

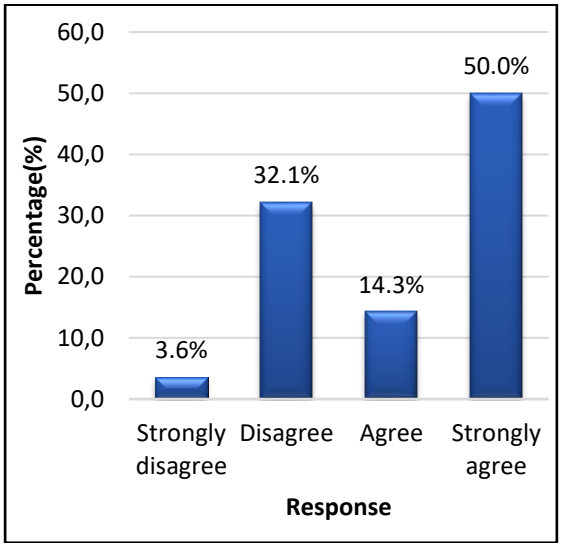
Figures 6.22, 6.23 and 6.24 illustrate participants' answers on the existence of a reporting line and the compliance function's advisory role regarding operational risk management.

Figure 6.22: Existence of a compliance function



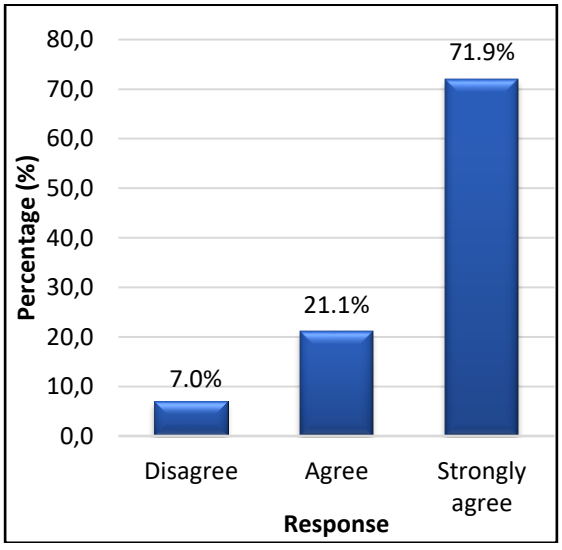
Source: Author (2020).

Figure 6.23: Reporting of a compliance function to the board of directors



Source: Author (2020).

Figure 6.24: Advisory role of a compliance function



Source: Author (2020).

Figure 6.22 shows that 75.4% of the respondents strongly agreed, 19.3% agreed, and 5.3% disagreed that an independent compliance function exists at their respective banks.

Figure 6.23 illustrates that 50.0% of the respondents strongly agreed, 14.3% agreed, 32.1% disagreed, and only 3.6% strongly disagreed that the compliance function reports directly to the board of directors at their respective banks.

Figure 6.24 illustrates that 71.9% of the respondents strongly agreed, 21.1% agreed, and 7.0% disagreed that the compliance function at their respective banks advises the board of directors and senior management on complying with laws and standards regarding the management of operational risk.

6.2.3.6 Internal audit

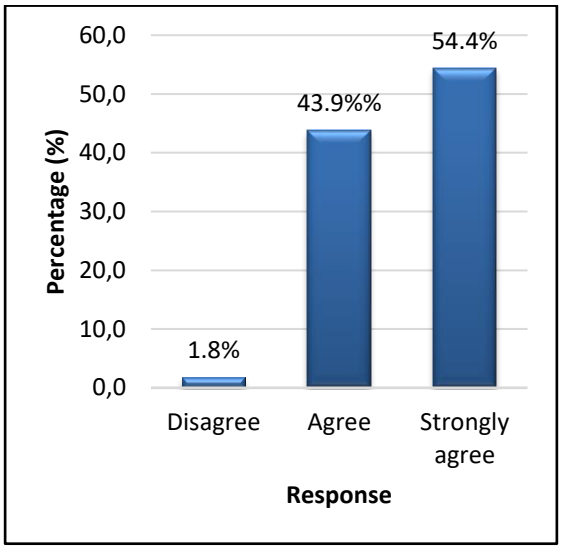
The third line of defence, internal audit, has the responsibility to provide assurance independently, objectively, impartially and competently on the efficiency and effectiveness of the operational risk management system implemented by the first and second lines of defence, and to inform senior management thereof. Internal audit is charged with the additional responsibility of reporting to the board of directors and audit committee and assuring regulators and external audit that operational risk management activities across the entire bank are effective (Deloitte, 2020; Luburić, 2017).

Although internal audit should not set the specific risk appetite or risk tolerance for operational risk, it should review the process's robustness by determining how these limits are set and why and how they are adjusted in response to changing conditions. Internal audit should also provide their opinion on the overall appropriateness and adequacy of the operational risk management framework and the associated governance processes throughout the entire bank (BIS, 2011a; Luburić, 2016).

It is important to emphasise that the highest level of independence and objectivity is required for the third line of defence to function effectively. This can best be achieved by implementing the required governance structures within a bank; which enables a direct reporting line and unrestricted access to senior management and the board of directors (BIS, 2011a; BIS, 2015a).

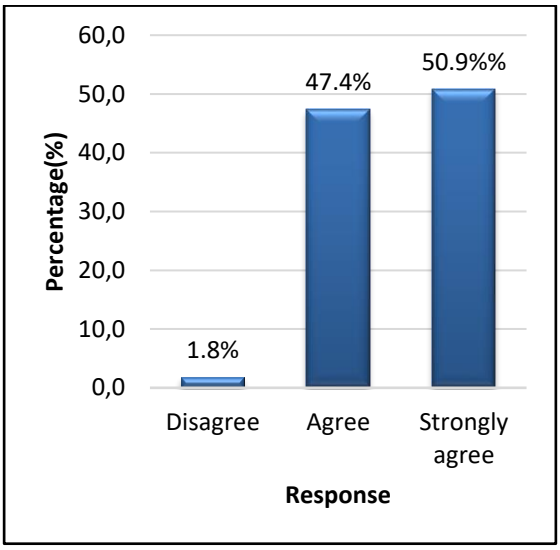
Figures 6.25 and 6.26 provide further insight into the perceptions of the surveyed Ghanaian banks on internal audit's vital role in ensuring effective and efficient operational risk management.

Figure 6.25: Periodic assessments conducted by internal audit for operational risk management



Source: Author (2020).

Figure 6.26: Independent assessment of effectiveness and efficiency of operational risk management practices



Source: Author (2020).

Figure 6.25 illustrates that 54.4% of the respondents strongly agreed, 43.9% agreed, and 1.8% disagreed that internal audit performs periodic assessments of their respective bank's risk governance framework regarding operational risk management.

Figure 6.26 shows that 50.9% of the respondents strongly agreed, 47.4% agreed, and 1.8% disagreed that internal audit independently assesses the effectiveness and efficiency of their respective banks' operational risk management practices.

6.2.3.7 Disclosure and transparency

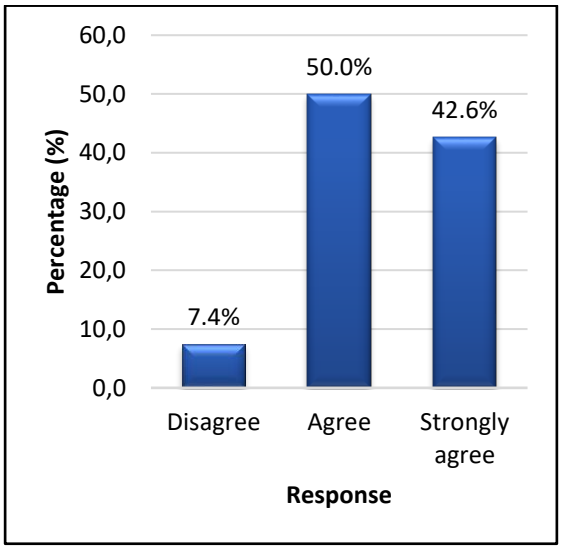
A bank's public disclosure protocol should allow stakeholders to assess its approach to the management of operational risk. The public disclosure of its operational risk management practices should enable all relevant stakeholders to determine if the bank identifies, assesses, monitors, controls and mitigates operational risk effectively (BIS, 2011a; De Cos, 2020).

The BCBS believed that timely and frequent public disclosure of relevant information by banks can lead to enhanced market discipline and contribute to more effective operational risk management practices (BIS, 2002b; BIS, 2011a).

It is, however, important that a bank's disclosure practices are consistent with how senior management and the board of directors assess and manage operational risk. Barakat and Hussainey (2013) stated that a bank's public disclosure of operational risk management information will lead to improved transparency and better industry practices by promoting rigorous market discipline.

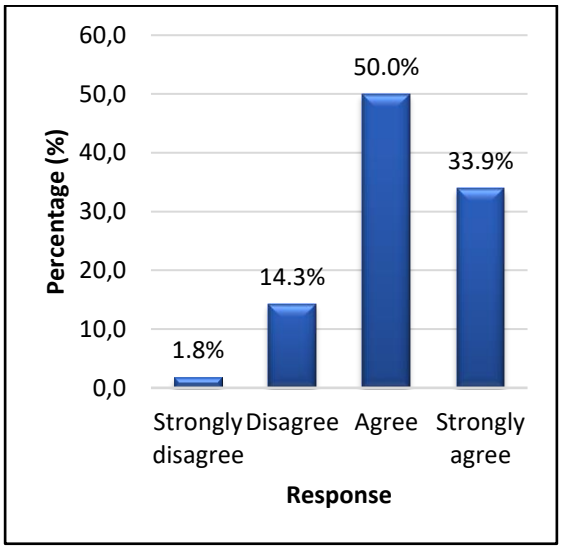
Figures 6.27 and 6.28 provide additional insight into the surveyed Ghanaian banks' practices concerning public disclosure practices of operational risk management.

Figure 6.27: The disclosure of operational risk exposures and risk management strategies



Source: Author (2020).

Figure 6.28: The disclosure of operational risk information to relevant stakeholders



Source: Author (2020).

Figure 6.27 illustrates that 42.6% of the respondents strongly agreed, 50.0% agreed, and 7.4% disagreed that their respective banks disclose key points concerning their risk exposures and risk management strategies regarding the management of operational risk.

Figure 6.28 indicates that 33.9% of the respondents strongly agreed, 50.0% agreed, 14.3% disagreed, and only 1.8% strongly disagreed that their respective banks disclose information in such a manner that all the relevant stakeholders can access and comprehend the operational risk information without difficulty.

6.2.3.8 The bank supervisor

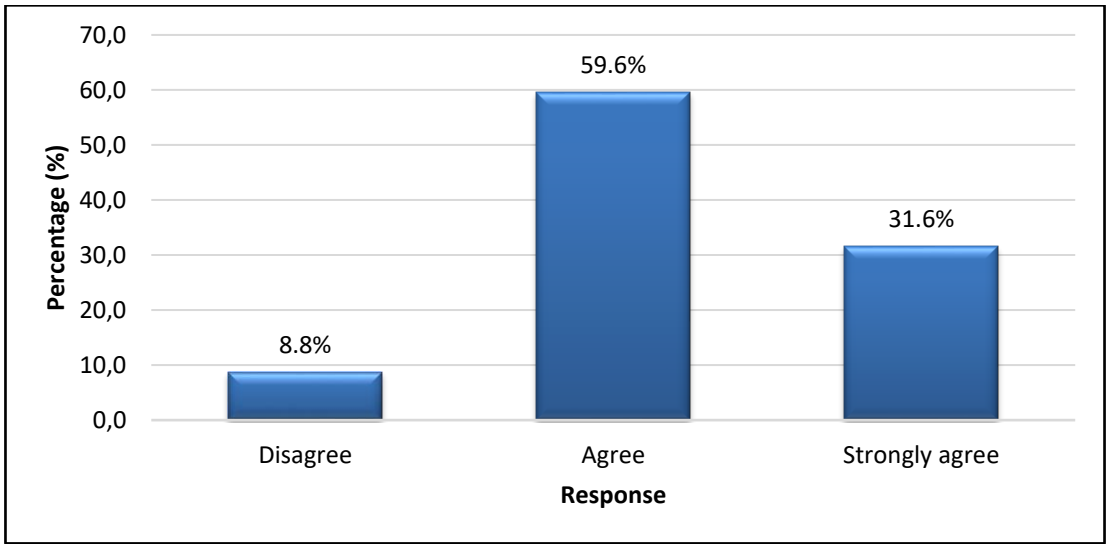
The primary objective of banking supervision is to promote the safety and soundness of banks and the banking system (BIS, 2020).

Bank supervision should ideally be conducted in a forward-looking manner in order to prevent identified weaknesses from escalating into larger threats, which can adversely affect a bank's financial stability and even disrupt the entire banking system (De Cos, 2020).

The bank supervisor requires that banks should have a suitable operational risk management framework that explicitly considers a bank's risk appetite, risk profile, macroeconomic conditions and market conditions. This includes carefully formulating policies and processes to identify, assess, evaluate, monitor, report, mitigate and control operational risk on a regular basis (De Cos, 2020).

Figure 6.29 demonstrates the supervisory guidance provided by the bank supervisor to the Ghanaian banks surveyed.

Figure 6.29: Bank supervisory guidance received regarding operational risk management



Source: Author (2020).

Figure 6.29 shows that 31.6% of the respondents strongly agreed, 59.6% agreed, and 8.8% disagreed that their respective banks receive regular guidance from the bank supervisor regarding the management of operational risk.

In addition to the above-mentioned roles and responsibilities, the bank supervisor utilises various tools to regularly review and assess the safety and soundness of banks and the banking system. Any deficiencies identified during the supervisory review process may be addressed through various guiding tools. These guiding tools include: consistent communication with the board of directors and senior management, on- and off-site monitoring of operational risk management practices, encouraging banks to conduct operational risk management self-assessments, conducting interviews with relevant personnel on operational risk management issues and concerns, and providing training interventions to key personnel in order to improve the management of operational risk (BIS, 2011a; BIS, 2014c; De Cos, 2020).

Further, the bank supervisor is responsible for providing remedial action when needed by deploying supervisory resources on a proportionate basis and taking into account a bank's risk profile and systemic importance (BIS, 2011a; BIS, 2014c; De Cos, 2020).

The type of guidance the bank supervisor provides to Ghanaian banks regarding the management of operational risk is summarised in Table 6.1. The respondents were required to indicate whether they agreed (strongly agree, agree, disagree, and strongly disagree) with the type of guidance they receive from the bank supervisor.

Table 6.1: Type of guidance provided by the bank supervisor

Types of guidance	Rating (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
Regular communication	70	21	9	0
Interviews	21	42	28	9
On- and off-site monitoring	39	52	7	2
Self-assessments	20	42	25	13
Training	16	30	44	10

Source: Author (2020).

6.2.3.8.1 Regular communication

Seventy per cent (70%) of the respondents strongly agreed, 21% agreed, and 9% disagreed that their respective banks receive guidance from the bank supervisor in the form of communication with the board of directors and senior management on a regular basis.

6.2.3.8.2 Interviews

The survey showed that 21% of the respondents strongly agreed, 42% agreed, 28% disagreed, and 9% strongly disagreed that their respective banks receive guidance from the bank supervisor through conducting interviews with relevant personnel.

6.2.3.8.3 On- and off-site monitoring

Thirty-nine per cent (39%) of the respondents strongly agreed, 52% agreed, 7% disagreed, and a final 2% strongly disagreed that their respective banks receive guidance from the bank supervisor in the form of on- and off-site monitoring of operational risk management practices.

6.2.3.8.4 Self-assessments

The data indicated that 20% of the respondents strongly agreed, 42% agreed, 25% disagreed, and 13% strongly disagreed that their respective banks receive guidance from

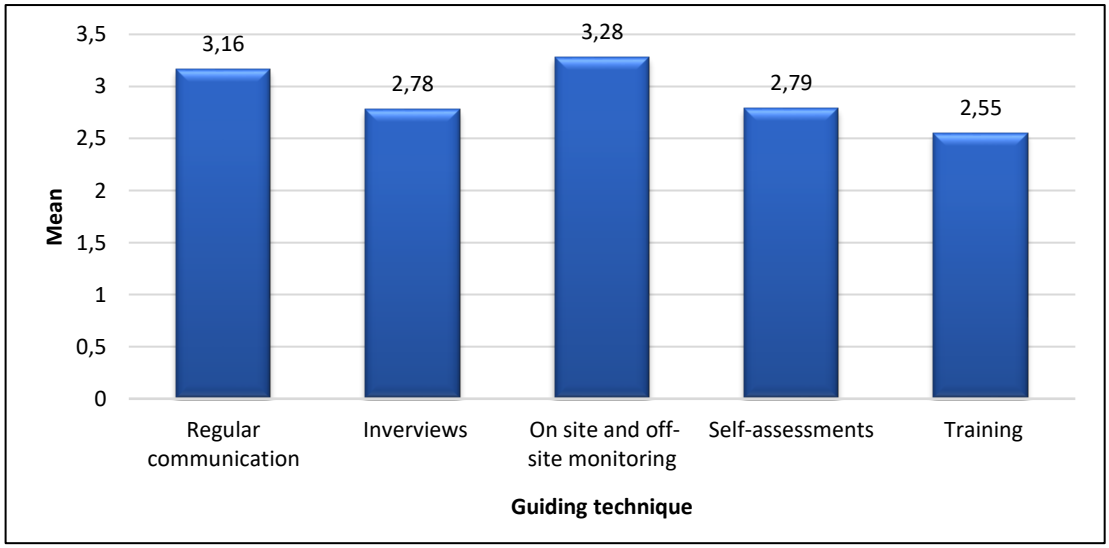
the bank supervisor by receiving clear direction on undertaking operational risk management self-assessments.

6.2.3.8.5 Training

It was found that 16% of the respondents strongly agreed, 30% agreed, 44% disagreed, and 10% strongly disagreed that their respective banks receive guidance from the bank supervisor in the form of training interventions to personnel in order to improve the management of operational risk.

Figure 6.30 provides additional information on the type of guidance offered to the surveyed Ghanaian banks. The figure reports the mean of each supervisory guiding technique, according to a four-point Likert scale, ranging from strongly agree to strongly disagree. This figure is insightful as it provides information on the frequency of supervisory guiding techniques provided by the bank supervisor to Ghanaian banks.

Figure 6.30: Type of guidance provided by the bank supervisor



Source: Author (2020).

On- and off-site monitoring is the guiding technique offered most frequently by the bank supervisor to banks, with a mean of 3.28 (standard deviation 0.71). Regular communication with the board of directors and senior management is the second most frequently offered guiding technique used by the bank supervisor, with a mean of 3.16 (standard deviation 0.629). Operational risk management self-assessment is the third

most frequently offered guiding technique employed by the bank supervisor to advise banks, with a mean of 2.79 (standard deviation 0.96). Interviews with key bank personnel are the fourth most frequently offered guiding technique used by the bank supervisor, with a mean of 2.78 (standard deviation 0.88). Training interventions are the guiding technique used least frequently by the bank supervisor to banks, with a mean of 2.55 (standard deviation 0.88).

6.2.4 Section 4: Risk culture perspectives on the management of operational risk

This section will discuss the participants' responses on risk culture regarding operational risk management among the surveyed Ghanaian banks.

6.2.4.1 Existence and responsibility of a risk culture

According to the BCBS, risk management must be embedded into a bank's culture. Risk management should be a critical focus area of the CEO, CRO, chief operating officer (COO), senior management, and all business-line heads. These officials should communicate risk management information to all staff members in order for them to make accurate strategic and day-to-day business decisions (BIS, 2020).

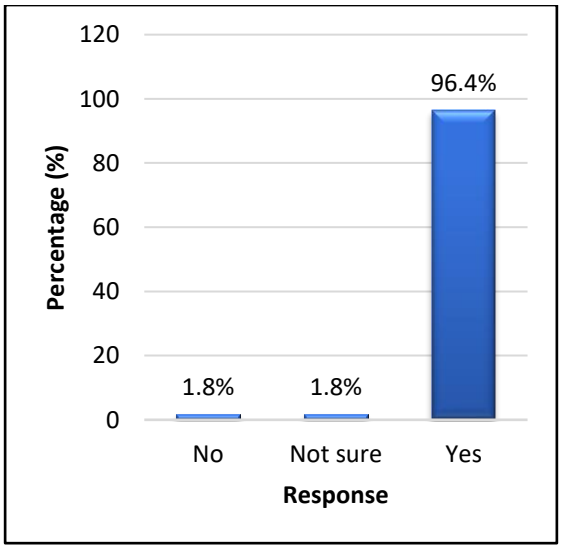
A risk culture is fundamental to effective risk governance, organisational success and value creation. The Committee of Sponsoring Organisations (COSO) updated its enterprise risk management framework in 2019 and acknowledged risk culture's vital role in ERM. The boards of directors of organisations are responsible for embedding a risk culture into discussions concerning strategy and risk management. Implementing the 3LOD model to manage operational risk will only deliver optimal results if it is supported by an organisational culture that enables and promotes effective risk management (Global Institute of Internal Auditors, 2019).

The board of directors and senior management should provide the necessary leadership to build and maintain a strong risk culture for operational risk management. Banks with a robust risk culture and solid ethical business practices are less likely to experience potentially damaging operational risk events and are better equipped to deal effectively

with operational risk events when they occur (De Cos, 2020; BIS, 2011a; Pepi, 2019; Stanciu, 2010).

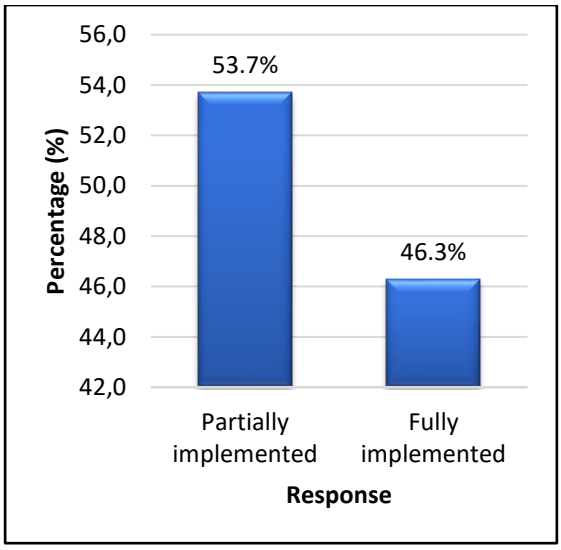
Figures 6.31 to 6.33 provide additional insight into the risk culture at the surveyed Ghanaian banks.

Figure 6.31: Existence of risk culture with regard to the management of operational risk



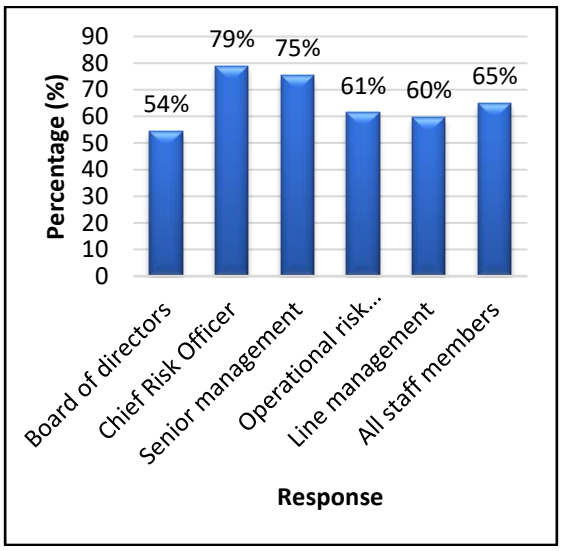
Source: Author (2020).

Figure 6.32: Implementation of a risk culture with regard to the management of operational risk



Source: Author (2020).

Figure 6.33: Responsibility for the existence of risk culture



Source: Author (2020).

Figure 6.31 shows that 96.4% of the respondents indicated that a risk culture exists at their respective banks, which encourages communication, collaboration, and interaction between the 3LOD with regard to the management of operational risk. Only 1.8% mentioned that such a risk culture does not exist at their banks, and 1.8% indicated that they are unsure whether such a risk culture exists at their banks.

Figure 6.32 illustrates that 46.3% of the respondents believed that a risk culture that supports the effective management of operational risk is fully implemented at their respective banks, with 53.7% reporting that such a risk culture is only partially implemented at their respective banks.

For the question relating to the responsibility for the existence of a risk culture (refer to Appendix A), the respondents were able to select more than one answer to the question. Figure 6.33 illustrates that establishing and maintaining a risk culture that supports the effective management of operational risk is regarded as a joint responsibility shared by the CRO (79%), senior management (75%), all relevant staff members (65%), the operational risk committee (61%), line management (60%), and the boards of directors (54%).

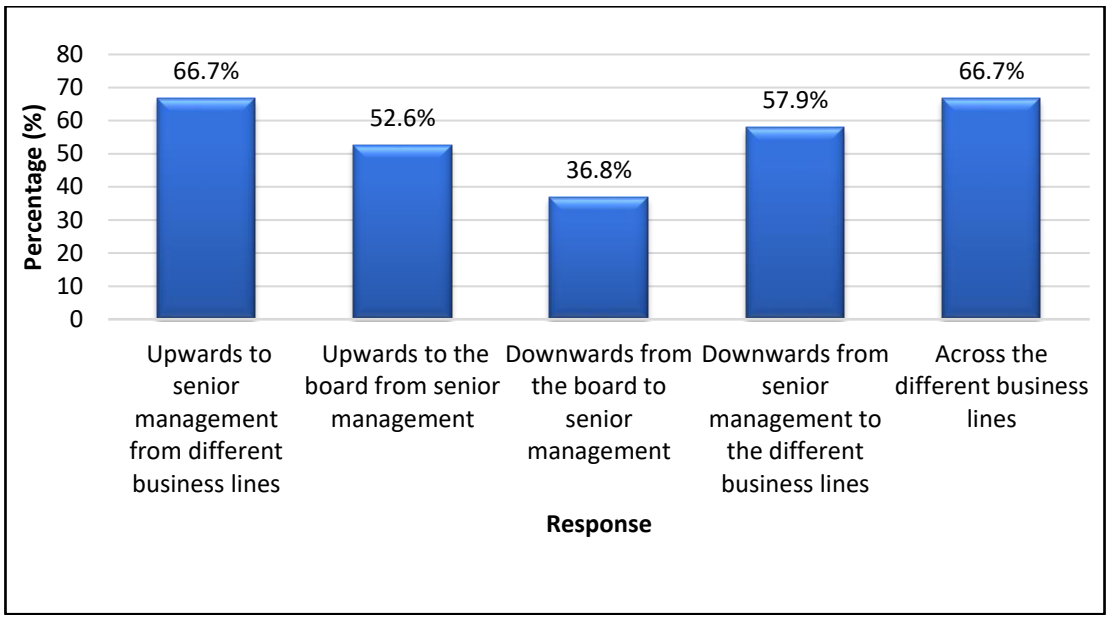
6.2.4.2 How operational risk communication occurs

The Institute of Risk Management (a leading professional body for ERM in the UK) recommended that staff members of financial institutions interact and communicate regularly with each other to manage operational risk effectively (IRM, 2012a). The flow of information within banks plays a significant role in establishing and maintaining an efficient operational risk management framework (BIS, 2001; BIS, 2011a).

The board of directors and senior management are responsible for communicating that operational risk management is an institutional priority. To ensure that all staff members fully understand and adhere to policies, processes, and procedures regarding operational risk management, banks should ensure that sufficient information flows both vertically (between different levels in the bank) and horizontally (between functional units in the bank). (BIS, 2001; BIS, 2004; BIS, 2011a; Croitoru, 2014; Pepi, 2019; Stanciu, 2010).

Figure 6.34 illustrates how the surveyed Ghanaian banks communicate operational risk information.

Figure 6.34: How operational risk communication occurs



Source: Author (2020).

For this specific question of the questionnaire, the respondents were able to select more than one answer to the question. Figure 6.34 shows a consistent trend in how operational risks are communicated across the different business lines of the Ghanaian banks surveyed. The respondents indicated that the most common way operational risks are communicated is upwards to senior management from the different business lines (66.7%) and across the different business lines (66.7%) at their respective banks. The communication of operational risks also occurs downwards from senior management to the various business lines (57.9%) and upwards to the board of directors from senior management (52.6%). According to the respondents, the least common way operational risk information is communicated is downwards from the board of directors to senior management (36.8%) of the bank.

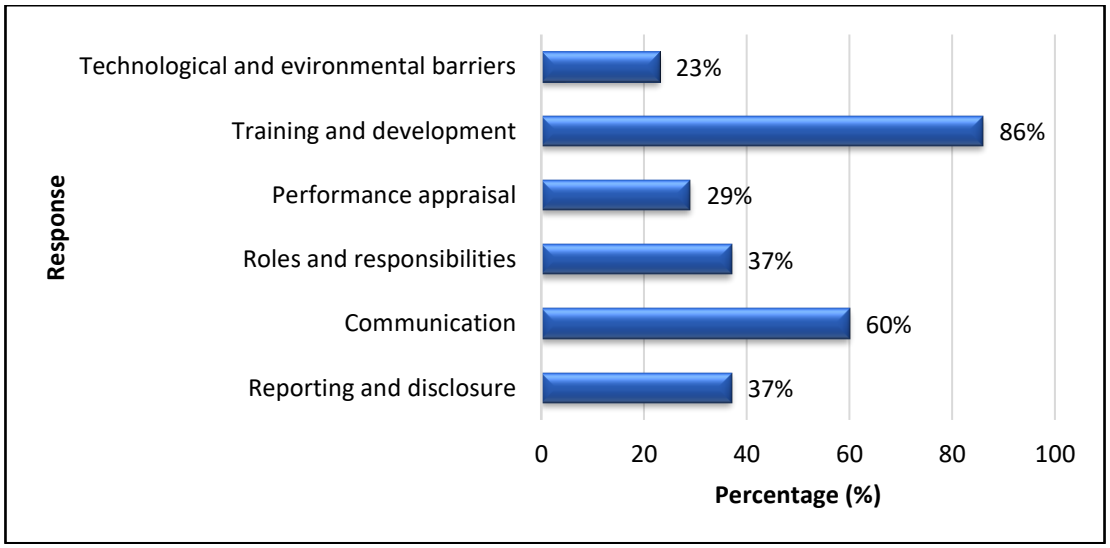
6.2.4.3 Challenges with the implementation of a risk culture

This question of the questionnaire was an open-ended question, where the respondents were invited to explain/express the current challenges at their respective banks regarding

the implementation of a risk culture that supports and promotes the effective management of operational risk.

Figure 6.35 illustrates the most significant challenges that the surveyed Ghanaian banks face in implementing a risk culture that supports and promotes the effective management of operational risk.

Figure 6.35: Challenges with the implementation of a risk culture



Source: Author (2020).

Figure 6.35 illustrates that the most severe challenge to implementing a risk culture that supports and promotes the effective management of operational risk is the training and development (86%) of bank personnel. The second most severe challenge is effective communication (60%) of operational risk information to the bank's different business lines. The roles and responsibilities (37%) of bank employees and the reporting and disclosure of operational risk management information to all the relevant stakeholders of the bank (37%) are jointly ranked third. Performance appraisal (29%) is ranked fourth, and technological and environmental barriers (23%) are ranked fifth.

6.3 Synthesis of data analyses and results

This chapter discussed the descriptive statistical data analyses and results of the questionnaire designed to investigate the research questions of this study. This discussion comprised: (1) general information, (2) operational risk management

perspectives, (3) the governance of operational risk, and (4) risk culture perspectives on the management of operational risk.

6.3.1 General information

Section 1 of the questionnaire consisted of three questions. The purpose of this section was to gain general information on the different business lines offered by the surveyed Ghanaian banks and to obtain the respondents' information concerning their current area of specialisation and their years of experience working for a bank within the Ghanaian banking sector. The collected data revealed that the Ghanaian banks surveyed offered a broad spectrum of business lines, with the dominant business lines being retail banking, commercial banking, payment and settlement, trading and sales services, and corporate finance. At the time of the data collection, the respondents were employed in risk management, corporate governance and compliance, finance, investment and accounting, treasury, and credit, with the majority of the respondents employed in risk management (80.7%) followed by corporate governance and compliance (10.5%). The relevant experience of the respondents varied between 2 and 28 years, with 11 years being the average number of years.

6.3.2 Operational risk management perspectives

The surveyed Ghanaian banks have not fully implemented the Basel II regulatory framework's operational risk requirements. Just over half of the respondents (51%) indicated that their respective banks are still in the process of implementing the requirements and a small minority (2%) indicated their banks have not begun with implementation. The implementation status of the operational risk requirements of the Basel III regulatory framework was identified as an area that should receive particular attention, as only five per cent (5%) of the banks surveyed have fully implemented the Basel III operational risk management requirements. Fifty-eight per cent (58%) of respondents indicated that their respective banks are still in the process of implementing the Basel III operational risk management requirements. Therefore, this study's findings and recommendations will be of value to Ghanaian banks. The study will assist these

banks in complying with the Basel III requirements on operational risk management and will promote financial stability and resilience in the country's banking sector.

The respondents' reports on their banks' practices regarding identifying, measuring, monitoring and reporting operational risk were investigated. It was found that the surveyed Ghanaian banks utilise several operational risk management tools in their operational risk management practices. However, the use of specific operational tools, including external data collection, scenario analysis and comparative analysis, can be improved. It is therefore recommended that additional support and guidance be given to Ghanaian banks through external consulting firms, operational risk management experts and the bank supervisor to enable banks to utilise the above-mentioned operational risk management tools more effectively. If Ghanaian bank personnel have the required competencies, skills, and knowledge to utilise each available operational risk management tool sufficiently and effectively, the identification and assessment of operational risks will be enhanced. This will positively impact the overall effectiveness of the Ghanaian banks' operational risk management practices.

Furthermore, the results indicate that the surveyed Ghanaian banks pay particular attention to monitoring operational risks, as the majority of the respondents reported that operational risks are either monitored to a very large extent (65%) or monitored to a large extent (33%). The majority of the Ghanaian banks surveyed have reporting procedures in place at board level (68% to a very large extent, 30% to a large extent, 2% to a limited extent), senior management level (49% to a very large extent, 47% to a large extent, 4% to a limited extent) and business-line level (39% to a very large extent, 54% to a large extent, 7% to a limited extent) to enable the proactive management of operational risk.

The operational risk management practices should be disclosed to enable all relevant stakeholders to determine whether a bank successfully identifies, assesses, monitors, controls, and mitigates operational risk. The public disclosure activities of the surveyed Ghanaian banks can be improved. Only 50% of the respondents reported (25% agreed to a very large extent and 25% to a large extent) that their respective banks disclose operational risk management information to enable all stakeholders to assess the bank's approach to operational risk management. By improving the disclosure and transparency

of operational risk management information to relevant stakeholders, the Ghanaian banks' compliance with the operational risk management requirements of the Basel III regulatory frameworks will be enhanced.

The data showed that the Ghanaian banks surveyed are of the opinion that effective operational risk management practices are beneficial and valuable. The majority of respondents either strongly agreed (42%) or agreed (53%) that effective operational risk management could free up capital that could then be utilised for other bank activities. This was supported by the fact that the respondents either strongly agreed (33%) or agreed (45%) that effective operational risk management lowers the profit and loss volatility of banks and by the fact that most respondents either strongly agreed (33%) or agreed (63%) that effective operational risk management could give a bank a competitive advantage.

6.3.3 The governance of operational risk

From the collected data, it is clear that the majority of the banks surveyed have a designated operational risk department responsible for the overall management of operational risk, as 96% of the respondents indicated that an operational risk management department exists at their respective banks. The Basel III regulatory framework prescribes that the operational risk management department should ideally report to the CRO of the bank. Nevertheless, only 40% of respondents indicated that the operational risk department reports directly to the CRO of their banks, which indicates that additional attention should be given to the reporting protocol of the operational risk management departments of Ghanaian banks.

Careful attention should be paid to the CRO's responsibilities, positioning and reporting line within Ghanaian banks. The correct positioning of the CRO is critical, as it will directly impact the effectiveness of operational risk management. It is recommended that the CROs of Ghanaian banks have a direct reporting line to the boards of directors and also report directly to the CEOs of their respective banks. The collected data revealed that the reporting line from the CRO to the board of directors could be significantly improved, as only 17.9% of the respondents indicated that the CRO of their bank's reports to the board

of directors. The fact that 71.4% of respondents indicated that the CRO of their respective banks' reports directly to the CEO of the bank is optimistic as it is in line with best practice and the Basel III regulatory framework requirements. However, it would be optimal if all Ghanaian banks had an appointed CRO who reports directly to the CEO of their bank.

The literature rightfully emphasises that when the 3LOD risk operating model is correctly structured and established, with no breaches in coverage, banks will reap the benefits of a more efficient and effective operational risk management function. The Ghanaian banks surveyed understand the importance of the correct formation of the 3LOD to some extent. However, l improvements can be made to each line of defence to prevent unnecessary breaches in coverage. Definite improvements can also be made to the communication of operational risk information and activities between the different lines of defence. In the first instance, the communication channels between the 3LOD can be improved.

Compliance concerns every bank employee and should be considered an essential component of a bank's operational risk management practices. For the compliance function to operate effectively within banks operating in Ghana, it must have sufficient authority, stature, independence, resources and access to their boards of directors. The management teams of Ghanaian banks should respect the compliance function's independent duties without unnecessary interference. The compliance function should, furthermore, report directly to the board of directors on all critical matters concerning operational risk management. The majority of respondents indicated that their bank has an active compliance function which provides advisory support to senior management and the board of directors.

Internal audit is tasked with the responsibility to independently, objectively, impartially, and competently provide assurance on the efficiency and effectiveness of the operational risk management controls and system implemented by the first and second lines of defence; and then to communicate this information to the senior management of their banks. The majority of surveyed banks acknowledge the value of internal audit in ensuring the effective and efficient management of operational risk.

The surveyed Ghanaian banks regard the disclosure of operational risk information to key stakeholders as essential to improving market discipline. Disclosure of this information

makes a valuable contribution to effective operational risk management practices. This is in line with the operational risk requirements stipulated by the Basel III regulatory framework.

Regarding bank supervision, the bank supervisor utilises various tools to regularly review and assess the safety and soundness of individual banks operating within Ghana. These guiding tools include: consistent communication with the board of directors and senior management, on- and off-site monitoring of operational risk management practices, encouraging banks to conduct operational risk management self-assessments, conducting interviews with relevant personnel on operational risk management issues and concerns, and providing training interventions to key personnel in order to improve the management of operational risk. From the collected data, it can be confirmed that the bank supervisor thoroughly and consistently employs various techniques in guiding Ghanaian banks with their operational risk management practices. However, it would be beneficial to Ghanaian banks if the availability and implementation of operational risk training interventions offered to bank personnel were enhanced.

6.3.4 Risk culture perspectives on the management of operational risk

The literature confirms that a bank with a deep-rooted, robust risk management culture supported by sound ethical business practices is less likely to suffer damaging consequences of operational risk events. Such a bank is also better prepared to deal optimally with adverse operational risk events when they occur.

From the data collected, significant guidance can be provided to Ghanaian banks in order for them to establish and enhance a risk culture that supports and promotes the effective management of operational risk.

The way in which operational risk information is communicated, both horizontally and vertically, can be improved within Ghanaian banks. It is crucial to improve the communication between the board of directors and senior management and between the 3LOD to properly distribute operational risk information across the banks' other business lines.

Additional challenges that Ghanaian banks should address are:

- the training and development of staff members to improve their operational risk management skills;
- the provision of performance appraisal measurements to staff members to encourage effective operational risk management practices; and
- the swift adaptation to a dynamic banking environment by remaining up to date with the latest technological developments.

6.4 Conclusion

This chapter presented the descriptive statistical analyses of the questionnaire and linked the descriptive statistical results to the primary and secondary objectives of the study.

In the next chapter, the results of the inferential statistical analyses will be presented.

Chapter 7 - Inferential analyses and results

7.1 Introduction

This chapter presents the inferential statistical analyses (the Mann-Whitney U test, the Fisher exact test and multiple regression analyses) conducted on the primary data collected from the surveyed Ghanaian banks to address the following research objectives:

- To investigate the operational risk management practices of Ghanaian banks (SRO_{13}).
- To explore the risk governance practices of Ghanaian banks (SRO_{14}).
- To assess the implementation of a risk culture of Ghanaian banks SRO_{15}).

The inferential statistical analyses are presented in four parts.

Part one (Section 7.2) reports on:

- The level of implementation of the Basel III operational risk management requirements and the different operational risk management tools utilised as a cohesive unit (H_1), as well as separately on each operational risk management tool (H_2 – H_{10}) − by reporting on ten hypotheses.
- The level of implementation of the Basel III operational risk management requirements and the benefit of operational risk management − by reporting on one hypothesis (H_{11}).
- The level of implementation of the Basel III operational risk management requirements and various operational risk governance components − by reporting on six hypotheses (H_{12} – H_{17}).

Part two (Section 7.3) reports on:

- The level of implementation of a risk culture that encourages and supports operational risk management and the operational risk management tools utilised − by reporting on one hypothesis (H_{18}).

- The level of implementation of a risk culture that encourages and supports operational risk management and the benefit of operational risk management − by reporting on one hypothesis (H_{19}).
- The level of implementation of a risk culture that encourages and supports operational risk management and various risk governance components − by reporting on six hypotheses (H_{20} – H_{25}).

Part three (Section 7.4) focuses on:

- Determining whether there is a statistically significant association in surveyed Ghanaian banks between their level of implementation of Basel III's operational risk management requirements and the level of implementation of a risk culture that supports and promotes the management of operational risk − by reporting on the findings of one hypothesis (H_{26}).

In the last part of this chapter (Section 7.5), three multiple regression analyses are presented.

- The first investigated whether the total number of operational risk management tools utilised by the surveyed Ghanaian banks and their level of implementation of the operational risk management requirements of Basel III could predict the level of agreement on the perceived benefit of operational risk management.
- The second multiple regression investigated whether the level of implementation of the operational risk management requirements of Basel III and the level of implementation of a risk culture that encourages and supports operational risk management at the surveyed banks could predict the level of agreement on the perceived benefit of operational risk management.
- The third multiple regression analysis investigated whether the level of implementation of the operational risk management requirements of Basel III and the level of implementation of a risk culture that encourages and supports operational risk management at the surveyed banks could predict the disclosure and transparency of operational risk management information.

7.2 Level of implementation of the Basel III operational risk management requirements

Section 7.2 is presented in three parts:

- The level of implementation of the Basel III operational risk management requirements and the different operational risk management tools utilised as a cohesive unit and individually (Section 7.2.1).
- The level of implementation of the Basel III operational risk management requirements and the benefit of operational risk management (Section 7.2.2).
- The level of implementation of the Basel III operational risk management requirements and the governance of operational risk (Section 7.2.3).

The analyses of the ordinal data included surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk management requirements and those that have not yet started the process of implementation. When analysing the surveyed Ghanaian banks' level of implementation of Basel III operational risk management requirements, the Mann-Whitney U test (H_1; H_{11} – H_{17}) and the Fisher exact test (H_2 – H_{10}) were used.

Before Sections 7.2.1 to 7.2.3 are presented, the following matters relating to the Mann-Whitney U test and the Fisher exact test should be noted.

The Mann-Whitney U test:

- All the assumptions for the Mann-Whitney U test were met (Section 5.8.2.1).

The Fisher exact test:

- All the assumptions for the Fisher exact test were met (Section 5.8.2.2).

General notes regarding the statistical analyses:

- All the hypotheses were tested at a 5% level of significance.

- For ease of reporting the inferential statistical results, the shortened term "Basel III" is used instead of "Basel III regulatory framework".
- Only cases with valid values on all the variables involved were included in the analyses.

7.2.1 Operational risk management perspectives

Hypothesis H_1 was formulated to determine if a difference exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the number of operational risk management tools they utilise to identify and assess operational risk, using the Mann-Whitney U test. Thereafter, Fisher's exact test was utilised to determine if an association exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of the different operational risk management tools in H_2 – H_{10}.

7.2.1.1 Overall utilisation of operational risk management tools

The hypothesis regarding the level of implementation of Basel III's operational risk management requirements and the number of operational risk management tools they utilise to identify and assess operational risk was formulated as follows:

$H1_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of Basel III's operational risk management requirements and the number of operational risk management tools they utilise to identify and assess operational risk.

$H1_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of Basel III's operational risk management requirements and the number of operational risk management tools they utilise to identify and assess operational risk.

The results of the Mann-Whitney U test are presented in Tables 7.1, 7.2 and 7.3.

Table 7.1: Descriptive statistic for H1

Implementation level of the Basel III operational risk management requirements	N	Mean	Median	Std. deviation	Min	Max
Not implemented	19	5.37	6.00	2.83	0	9
In the process	33	7.24	8.00	1.44	4	9

Source: Author (2020).

Table 7.2: Ranks for H1

Implementation level of the Basel III operational risk management requirements	N	Mean rank	Sum of ranks
Not implemented	19	19.87	377.50
In the process	33	30.32	1000.50

Source: Author (2020).

Table 7.3: Test statistics for H1

Mann-Whitney U test results	
Mann-Whitney U	187.50
Wilcoxon W	377.50
z	-2.45
Asymptotic sig. (2-sided test)	0.01
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	-0.34

Source: Author (2020).

The results indicate that a statistically significant difference exists at the 5% level of significance (*p-value < 0.05*) between the surveyed banks that are in the process of implementation *(Mdn = 8.00, n = 33)* and those that have not implemented *(Mdn = 6.00, n = 19)* the operational risk management requirements of Basel III regarding the number of operational risk management tools they utilise to identify and assess operational risk U = 187.50, z = -2.45 p= 0.01. The p-value is smaller than the chosen significance value of 0.05. The null hypothesis can therefore be rejected.

To further investigate this statistically significant difference, the medians provided in Table 7.1 were considered. When considering the medians, it appears that the surveyed banks that are in the process of implementing the operational risk management requirements of Basel III tend to utilise more operational risk management tools to identify and assess operational risk (*Mdn = 8.00*) than those that have not implemented the operational risk management requirements of Basel III (*Mdn = 6.00*).

The analyses suggest that the surveyed banks that are closer to full implementation of the operational risk management requirements of Basel III have recognised the value and

importance of utilising various operational risk management tools and have therefore employed more of the available tools compared to those banks that are further away from full implementation.

An absolute r-value of 0.34 represents a medium effect size as r > 0.30 but < 0.50, implying that the finding is of medium practical importance (Field, 2013; Pallant, 2020).

7.2.1.2 Individual utilisation of operational risk management tools

The Fisher exact test was utilised to determine if an association exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of the different operational risk management tools, namely audit findings, internal loss data collection and analysis, external data collection and analysis, risk assessments, business process mapping, risk and performance indicators, scenario analysis, comparative analysis and stress testing.

7.2.1.2.1 Audit findings

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of audit findings to identify and assess operational risk was formulated as follows:

$H2_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of audit findings to identify and assess operational risk.

$H2_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of audit findings to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.4 and 7.5.

Table 7.4: Crosstabulation of audit findings

Audit findings		Basel III		
		Not implemented	In the process	Total
No	Frequency	5	0	5
	Percentage (%)	29.40%	0.00%	9.40%
Yes	Frequency	12	36	48
	Percentage (%)	70.60%	100.00%	90.60%
Total	Frequency	17	36	53
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.5: Fisher's exact test: Audit findings

Audit findings	Value	df	p-value
Pearson chi-square	11.69	1	0.001
Fisher's exact test			0.002

Source: Author (2020).

The results indicate that there is a statistically significant association ($p\text{-value} < 0.05$) at the 5% level of significance between the level of implementation of the Basel III

operational risk management requirements and the utilisation of audit findings to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 53) = 11.69$, $p = 0.002$. The study therefore rejects the null hypothesis.

When considering the crosstabulation of audit findings, it shows that the surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk management requirements (100%) are significantly more likely to utilise audit findings to identify and assess operational risk than those that have not implemented the Basel III operational risk management requirements (70.6%).

As audit findings primarily focus on managing the weaknesses and vulnerabilities of a bank, it is important that the senior management teams of Ghanaian banks provide the necessary support to the internal audit function to ensure that operational risks are effectively identified and assessed.

7.2.1.2.2 Internal loss data collection and analysis

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of internal loss data collection and analysis to identify and assess operational risk was formulated as follows:

$H3_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of internal loss data collection and analysis to identify and assess operational risk.

$H3_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of internal loss data collection and analysis to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.6 and 7.7.

Table 7.6: Crosstabulation of internal loss data collection and analysis

Internal loss data collection and analysis		Basel III		
		Not implemented	In the process	Total
No	Frequency	1	0	1
	Percentage (%)	5.9%	0.0%	1.9%
Yes	Frequency	16	35	51
	Percentage (%)	94.1%	100.0%	98.1%
Total	Frequency	17	35	52
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.7: Fisher's exact test: Internal loss data collection and analysis

Internal loss data collection and analysis	Value	df	p-value
Pearson chi-square	2.1	1	0.15
Fisher's exact test			0.33

Source: Author (2020).

The results indicate that there is no statistically significant association at the 5% level of significance (*p-value > 0.05*) between the level of implementation of the Basel III operational risk management requirements and the utilisation of internal loss data collection and analysis to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 52) = 2.1$, $p = 0.33$. The study fails to reject the null hypothesis.

It can therefore be stated that no association exists in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of internal loss data collection and analysis to identify and assess operational risk.

7.2.1.2.3 External data collection and analysis

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of external data collection and analysis to identify and assess operational risk was formulated as follows:

$H4_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of external data collection and analysis to identify and assess operational risk.

$H4_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of external data collection and analysis to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.8 and 7.9.

Table 7.8: Crosstabulation of external data collection and analysis

External data collection		Basel III		
		Not implemented	In the process	Total
No	Frequency	6	1	7
	Percentage (%)	42.9%	3.7%	17.1%
Yes	Frequency	8	26	34
	Percentage (%)	57.1%	96.3%	82.9%
Total	Frequency	14	27	41
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.9: Fisher's exact test: External data collection and analysis

External data collection	Value	df	p-value
Pearson chi-square	9.98	1	0.00
Fisher's exact test			0.00

Source: Author (2020).

The results indicate that there is a statistically significant association (*p-value* < *0.05*) at the 5% level of significance between the level of implementation of the Basel III

operational risk management requirements and the utilisation of external data collection and analysis to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 41) = 9.98$, $p = 0.00$. The study therefore rejects the null hypothesis.

When considering the crosstabulation of external data collection, it appears that the surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk management requirements (96.3%) are significantly more likely to utilise external data collection and analysis to identify and assess operational risk than those that have not implemented the operational risk management requirements of Basel III (57.1%).

It is apparent that the surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk management requirements are making better use of external data collection and analysis to benchmark themselves against other banks of a similar size and risk profile, thereby enhancing their operational risk management procedures.

7.2.1.2.4 Risk assessments

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of risk assessments to identify and assess operational risk was formulated as follows:

$H5_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of risk assessments to identify and assess operational risk.

$H5_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of risk assessments to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.10 and 7.11.

Table 7.10: Crosstabulation of risk assessments

Risk assessments		Basel III		
		Not implemented	In the process	Total
No	Frequency	4	0	4
	Percentage (%)	21.1%	0.00%	7.4%
Yes	Frequency	15	35	50
	Percentage (%)	78.9%	100.00%	92.6%
Total	Frequency	19	35	54
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.11: Fisher's exact test: Risk assessment

Risk assessments	Value	df	p-value
Pearson chi-square	7.96	1	0.01
Fisher's exact test			0.01

Source: Author (2020).

The results indicate that there is a statistically significant association ($p\text{-value} < 0.05$) at the 5% level of significance between the level of implementation of the Basel III

operational risk management requirements and the utilisation of risk assessments to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 54) = 7.96$, $p = 0.01$. The study therefore rejects the null hypothesis.

When considering the crosstabulation of risk assessment, it appears that the surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk management requirements (100.00%) are significantly more likely to utilise risk assessments to identify and assess operational risk than those that have not implemented the Basel III operational risk management requirements (78.9%).

Risk assessments were found to be an important operational risk management tool to ensure business continuity and the surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk management requirements are demonstrating the active use of this tool to identify and analyse operational risk − thereby enabling them to implement appropriate risk-mitigating control procedures.

7.2.1.2.5 Business process mapping

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of business process mapping to identify and assess operational risk was formulated as follows:

$H6_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of business process mapping to identify and assess operational risk.

$H6_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of business process mapping to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.12 and 7.13.

Table 7.12: Crosstabulation of business process mapping

Business process mapping		Basel III		
		Not implemented	In the process	Total
No	Frequency	5	5	10
	Percentage (%)	31.3%	14.3%	19.6%
Yes	Frequency	11	30	41
	Percentage (%)	68.8%	85.7%	80.4%
Total	Frequency	16	35	51
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.13: Fisher's exact test: Business process mapping

Business process mapping	Value	df	p-value
Pearson chi-square	2.01	1	0.16
Fisher's exact test			0.25

Source: Author (2020).

The results indicate that there is no statistically significant association at the 5% level of significance (*p-value > 0.05*) between the level of implementation of the Basel III

operational risk management requirements and the utilisation of business process mapping to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 51) = 2.01$, $p = 0.25$. The study fails to reject the null hypothesis.

It can therefore be stated that no association exists in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of business process mapping to identify and assess operational risk.

7.2.1.2.6 Risk and performance indicators

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of risk and performance indicators to identify and assess operational risk was formulated as follows:

$H7_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of risk and performance indicators to identify and assess operational risk.

$H7_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of risk and performance indicators to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.14 and 7.15.

Table 7.14: Crosstabulation of risk and performance indicators

Risk and performance indicators		Basel III		
		Not implemented	In the process	Total
No	Frequency	5	1	6
	Percentage (%)	27.8%	2.7%	10.9%
Yes	Frequency	13	36	49
	Percentage (%)	72.2%	97.3%	89.1%
Total	Frequency	18	37	55
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.15: Fisher's exact test: Risk and performance indicators

Risk and performance indicators	Value	df	p-value
Pearson chi-square	7.83	1	0.01
Fisher's exact test			0.01

Source: Author (2020).

The results indicate that there is a statistically significant association (*p-value* < *0.05*) at the 5% level of significance between the level of implementation of the Basel III operational risk management requirements and the utilisation of risk performance indicators to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 55) = 7.83$, $p = 0.01$. The study therefore rejects the null hypothesis.

When considering the crosstabulation of risk performance indicators, it appears that the surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk management requirements (97.3%) are significantly more likely to utilise risk and performance indicators to identify and assess operational risk than those that have not implemented the Basel III operational risk management requirements of (72.2%).

The surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk management requirements are utilising risk and performance indicators to obtain relevant information on operational risk weaknesses and potential operational loss events, which provide these banks with a better perspective on their operational risk exposures.

7.2.1.2.7 Scenario analysis

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of scenario analysis to identify and assess operational risk was formulated as follows:

$H8_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of scenario analysis to identify and assess operational risk.

$H8_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of scenario analysis to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.16 and 7.17.

Table 7.16: Crosstabulation of scenario analysis

Scenario analysis		Basel III		
		Not implemented	In the process	Total
No	Frequency	7	7	14
	Percentage (%)	53.8%	23.3%	32.6%
Yes	Frequency	6	23	29
	Percentage (%)	46.2%	76.7%	67.4%
Total	Frequency	13	30	43
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.17: Fisher's exact test: Scenario analysis

Scenario analysis	Value	df	p-value
Pearson chi-square	3.85	1	0.05
Fisher's exact test			0.08

Source: Author (2020).

The results indicate that there is no statistically significant association at the 5% level of significance (*p-value > 0.05*) between the level of implementation of the Basel III

operational risk management requirements and the utilisation of scenario analysis to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 43) = 3.85$, $p = 0.08$. The study fails to reject the null hypothesis.

It can therefore be stated that no association exists in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of scenario analysis to identify and assess operational risk.

7.2.1.2.8 Comparative analysis

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of comparative analysis to identify and assess operational risk was formulated as follows:

$H9_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of comparative analysis to identify and assess operational risk.

$H9_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of comparative analysis to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.18 and 7.19.

Table 7.18: Crosstabulation of comparative analysis

Comparative analysis		Basel III		
		Not implemented	In the process	Total
No	Frequency	4	8	12
	Percentage (%)	33.3%	25.8%	27.9%
Yes	Frequency	8	23	31
	Percentage (%)	66.7%	74.2%	72.1%
Total	Frequency	12	31	43
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.19: Fisher's exact test: Comparative analysis

Comparative analysis	Value	df	p-value
Pearson chi-square	0.244	1	0.62
Fisher's exact test			0.71

Source: Author (2020).

The results indicate that there is no statistically significant association at the 5% level of significance (*p-value > 0.05*) between the level of implementation of the Basel III

operational risk management requirements and the utilisation of comparative analysis indicators to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 43) = 0.244$, $p = 0.71$. The study fails to reject the null hypothesis.

It can therefore be stated that no association exists in the surveyed Ghanaian banks between the level of implementation of the Basel III operational risk management requirements and the utilisation of comparative analysis to identify and assess operational risk.

7.2.1.2.9 Stress testing

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the utilisation of stress testing to identify and assess operational risk was formulated as follows:

$H10_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of stress testing to identify and assess operational risk.

$H10_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of stress testing to identify and assess operational risk.

The results of the Fisher exact test are presented in Tables 7.20 and 7.21.

Table 7.20: Crosstabulation of stress testing

Stress testing		Basel III		
		Not implemented	In the process	Total
No	Frequency	3	8	11
	Percentage (%)	18.8%	24.2%	22.4%
Yes	Frequency	13	25	38
	Percentage (%)	81.3%	75.8%	77.6%
Total	Frequency	16	33	49
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.21: Fisher's exact test: Stress testing

Stress testing	Value	df	p-value
Pearson chi-square	0.09	1	0.67
Fisher's exact test			1.00

Source: Author (2020).

The results indicate that there is no statistically significant association at the 5% level of significance (*p-value > 0.05*) between the level of implementation of the Basel III

operational risk management requirements and the utilisation of stress testing to identify and assess operational risk among the surveyed Ghanaian banks $x^2(1, 49) = 0.09$, $p = 1.00$. The study fails to reject the null hypothesis.

It can therefore be stated that no association exists in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the utilisation of stress testing to identify and assess operational risk.

7.2.2 The benefits of operational risk management

Hypothesis H_{11} was formulated to determine if a difference exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the benefits of operational risk management using the Mann-Whitney U test. The hypothesis was stated as follows:

$H11_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the benefits of operational risk management.

$H11_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the benefits of operational risk management.

The results of the Mann-Whitney U test are presented in Tables 7.22, 7.23 and 7.24.

Table 7.22: Descriptive statistic for H11

Implementation level of the Basel III operational risk management requirements	N	Mean	Median	Std. deviation	Min	Max
Not implemented	19	3.17	3.00	0.26	3	4
In the process	33	3.43	3.67	0.49	3	4

Source: Author (2020).

Table 7.23: Ranks for H11

Implementation level of the Basel III operational risk management requirements	N	Mean rank	Sum of ranks
Not implemented	19	21.08	379.50
In the process	33	28.68	946.50

Source: Author (2020).

Table 7.24: Test statistics for H11

Mann-Whitney U test results	
Mann-Whitney U	208.50
Wilcoxon W	379.50
z	-1.81
Asymptotic sig. (2-sided test)	0.04
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	-0.25

Source: Author (2020).

The results indicate that a statistically significant difference exists at the 5% level of significance (*p-value < 0.05*) between the surveyed banks that are in the process of implementation *(Mdn = 3.67, n = 33)* and those that have not implemented *(Mdn = 3.00, n =19)* the Basel III operational risk management requirements regarding their level of agreement on the benefits of operational risk management U = 208.50, z = -1.81, p= 0.04. The p-value is smaller than the chosen significance value of 0.05. The null hypothesis can therefore be rejected.

To further investigate this statistically significant difference, the medians provided in Table 7.22 were considered. When assessing the medians, it appears that the surveyed banks that are in the process of implementing the Basel III operational risk management requirements (*Mdn = 3.67*) tend to agree more strongly on the benefits of operational risk management compared to those that have not started the implementation process (*Mdn = 3.00*).

It can therefore be stated that the surveyed banks that are in the process of implementing the Basel III operational risk management requirements may have already experienced

and understood the benefits of the operational risk requirements compared to those banks that have not started with the implementation process. This finding must be considered in conjunction with the finding of H_1: that the surveyed banks that are in the process of implementing the operational risk management requirements of Basel III utilise more operational risk management tools to identify and assess operational risk. The more operational risk management tools a bank utilises to identify and assess operational risk, the more beneficial to a bank – highlighting the benefit of operational risk management.

An absolute r-value of 0.25 represents a medium effect size as $r > 0.10$ but < 0.30. This implies that the finding is of medium practical importance (Field, 2013; Pallant, 2020).

7.2.3 Governance of operational risk

Hypotheses H_{12} – H_{17} were formulated to determine if a difference exists in Ghanaian banks between their level of implementation of Basel III's operational risk management requirements and different aspects relating to operational risk governance using the Mann-Whitney U test. The different operational risk governance components examined are:

- the extent to which monitoring and reporting procedures are in place,
- the utilisation of the 3LOD risk operating model,
- the influence of the compliance function on the board and senior management in terms of complying with the operational laws and standards,
- the efficiency and effectiveness of the internal audit function to assess operational risk management independently,
- the disclosure of risk exposures and risk management strategies, and
- the guidance received from the bank supervisor.

7.2.3.1 Monitoring and reporting

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the extent to which they have monitoring and reporting procedures in place. The hypothesis was stated as follows:

$H12_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the extent to which they have monitoring and reporting procedures in place.

$H12_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the extent to which they have monitoring and reporting procedures in place.

The results of the Mann-Whitney U test are presented in Tables 7.25, 7.26 and 7.27.

Table 7.25: Descriptive statistic for H12

Implementation level of the Basel III operational risk management requirements	N	Mean	Median	Std. deviation	Min	Max
Not implemented	19	3.52	3.40	0.33	3.20	4.00
In the process	33	3.31	3.20	0.46	2.60	4.00

Source: Author (2020).

Table 7.26: Ranks for H12

Implementation level of the Basel III operational risk management requirements	N	Mean rank	Sum of ranks
Not implemented	19	31.32	595.00
In the process	33	23.73	783.00

Source: Author (2020).

Table 7.27: Test statistics for H12

Mann-Whitney U test results	
Mann-Whitney U	222.00
Wilcoxon W	783.00
z	-1.78
Asymptotic sig. (2-sided test)	0.08
Effect size: r ($\frac{Z}{\sqrt{N}}$)	-0.27

Source: Author (2020).

The results indicate that there is no statistically significant difference at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that are in the process of implementation *(Mdn = 3.20, n = 33)* and those that have not implemented *(Mdn = 3.40, n =19)* the Basel III operational risk management requirements regarding the extent to which they have monitoring and reporting procedures in place to U= 222.00, z = -1.78,

p= 0.08. The p-value is greater than the chosen significance value of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that there is no statistically significant difference in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the extent to which they have monitoring and reporting procedures in place.

An absolute r-value of 0.27 represents a medium effect size as r > 0.10 but < 0.30, implying that the finding is of medium practical importance (Field, 2013; Pallant, 2020).

7.2.3.2 The three lines of defence risk operating model

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk. The hypothesis was stated as follows:

$H13_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk.

$H13_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk.

The results of the Mann-Whitney U test are presented in Tables 7.28, 7.29 and 7.30.

Table 7.28: Descriptive statistic for H13

Implementation level of the Basel III operational risk management requirements	N	Mean	Median	Std. deviation	Min	Max
Not implemented	19	3.50	4.00	0.69	2.00	4.00
In the process	33	3.64	4.00	0.52	2.50	4.00

Source: Author (2020).

Table 7.29: Ranks for H13

Implementation level of the Basel III operational risk management requirements	N	Mean rank	Sum of ranks
Not implemented	19	25.18	478.50
In the process	33	27.26	899.50

Source: Author (2020).

Table 7.30: Test statistics for H13

Mann-Whitney U test results	
Mann-Whitney U	288.50
Wilcoxon W	478.50
z	-0.548
Asymptotic sig. (2-sided test)	0.584
Effect size: r ($\frac{z}{\sqrt[2]{N}}$)	-0.08

Source: Author (2020).

The results indicate that no statistically significant difference exists at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that are in the process of implementation *(Mdn = 4.00, n = 33)* and those that have not implemented *(Mdn = 4.00,n =19)* the Basel III operational risk management requirements regarding their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk U = 288.50, z = -0.548, p = 0.58. The p-value is greater than the chosen significance value of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that no statistically significant difference exists in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk.

An absolute r-value of 0.08 represents a small effect size as r < 0.10, implying that the finding is of little practical importance (Field, 2013; Pallant, 2020).

7.2.3.3 Compliance

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the compliance function advising the board and senior management about complying with laws and standards on operational risk. The hypothesis was stated as follows:

$H14_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the compliance function advising the board and senior management about complying with laws and standards on operational risk.

$H14_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the compliance function advising the board and senior management about complying with laws and standards on operational risk.

The results of the Mann-Whitney U test are presented in Tables 7.31, 7.32 and 7.33.

Table 7.31: Descriptive statistic for H14

Implementation level of the Basel III operational risk management requirements	N	Mean	Median	Std. deviation	Min	Max
Not implemented	19	3.68	4.00	0.50	2.67	4.00
In the process	33	3.44	3.33	0.53	2.33	4.00

Source: Author (2020).

Table 7.32: Ranks for H14

Implementation level of the Basel III operational risk management requirements of Basel III	N	Mean rank	Sum of ranks
Not implemented	19	30.92	587.50
In the process	33	23.95	790.50

Source: Author (2020).

Table 7.33: Test statistics for H14

Mann-Whitney U test results	
Mann-Whitney U	229.50
Wilcoxon W	790.50
z	-1.69
Asymptotic sig. (2-sided test)	0.09
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	-0.02

Source: Author (2020).

The results indicate that no statistically significant difference exists at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that are in the process of implementation *(Mdn = 3.33, n = 33)* and those that have not implemented *(Mdn = 4.00, n = 19)* the Basel III operational risk management requirements with regard to their level of agreement on the compliance function advising the board and senior management about complying with laws and standards on operational risk U= 229.50, z = -1.69 p = 0.09. The p-value is greater than the chosen significance level of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that no statistically significant difference exists in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on the compliance function advising the board and senior management about complying with laws and standards on operational risk.

An absolute r-value of 0.02 represents a small effect size as r < 0.10, implying that the finding is of little practical importance (Field, 2013; Pallant, 2020).

7.2.3.4 Internal audit

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement that the internal audit function independently assesses the effectiveness and efficiency of operational risk management. The hypothesis was stated as follows:

$H15_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement that the internal audit function independently assesses the effectiveness and efficiency of operational risk management.

$H15_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement that the internal audit function independently assesses the effectiveness and efficiency of operational risk management.

The results of the Mann-Whitney U test are presented in Tables 7.34, 7.35 and 7.36.

Table 7.34: Descriptive statistic for H15

Implementation level of the Basel III operational risk management requirements	N	Mean	Median	Std. deviation	Min	Max
Not implemented	19	3.63	4.00	0.50	3.00	4.00
In the process	33	3.47	3.50	0.53	2.50	4.00

Source: Author (2020).

Table 7.35: Ranks for H15

Implementation level of the Basel III operational risk management requirements	N	Mean rank	Sum of ranks
Not implemented	19	29.24	555.50
In the process	33	24.92	822.50

Source: Author (2020).

Table 7.36: Test statistics for H15

Mann-Whitney U test results	
Mann-Whitney U	261.50
Wilcoxon W	822.50
z	-1.10
Asymptotic sig. (2-sided test)	0.27
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	-0.15

Source: Author (2020).

The results indicate that no statistically significant difference exists at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that are in the process of implementation *(Mdn = 3.50, n = 33)* and those that have not implemented *(Mdn = 4.00, n = 19)* the Basel III operational risk management requirements with regard to their level of agreement that the internal audit function independently assesses the effectiveness

and efficiency of operational risk management U= 261.50, z = -1.10 p = 0.27. The p-value is greater than the chosen significance level of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that no difference exists in the surveyed banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement that the internal audit function independently assesses the effectiveness and efficiency of operational risk management.

An absolute r-value of 0.15 represents a medium effect size as r > 0.10 but < 0.30, implying that the finding is of medium practical importance (Field, 2013; Pallant, 2020).

7.2.3.5 Disclosure and transparency

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on disclosing key points concerning their risk exposures and risk management strategies regarding the management of operational risk. The hypothesis was stated as follows:

$H16_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on disclosing key points concerning their risk exposures and risk management strategies regarding the management of operational risk.

$H16_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on disclosing key points concerning their risk exposures and risk management strategies regarding the management of operational risk.

The results of the Mann-Whitney U test are presented in Tables 7.37, 7.38 and 7.39.

Table 7.37: Descriptive statistic for H16

Implementation level of the Basel III operational risk management requirements	N	Mean	Median	Std. deviation	Min	Max
Not implemented	19	3.19	3.50	0.57	2.00	4.00
In the process	33	3.33	3.00	0.51	2.50	4.00

Source: Author (2020).

Table 7.38: Ranks for H16

Implementation level of the Basel III operational risk management requirements	N	Mean rank	Sum of ranks
Not implemented	18	24.36	438.50
In the process	33	26.89	887.50

Source: Author (2020).

Table 7.39: Test statistics for H16

Mann-Whitney U test results	
Mann-Whitney U	267.50
Wilcoxon W	438.50
z	-0.60
Asymptotic sig. (2-sided test)	0.55
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	-0.08

Source: Author (2020).

The results indicate that no statistically significant difference exists at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that are in the process of implementation *(Mdn = 3.50, n = 33)* and those that have not implemented *(Mdn = 3.00, n = 19)* the Basel III operational risk management requirements with regard to their level of agreement on disclosing key points concerning their risk exposures and risk management strategies regarding the management of operational risk U = 267.50, z = -0.60 p = 0.55. The p-value is greater than the chosen significance level of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that no difference exists in the surveyed banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on disclosing key points concerning their risk exposures and risk management strategies regarding the management of operational risk.

An absolute r-value of 0.08 represents a small effect size as r < 0.10, implying that the finding is of little practical importance (Field, 2013; Pallant, 2020).

7.2.3.6 Bank supervision

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on receiving regular guidance from the bank supervisor concerning the governance and management of operational risk. The hypothesis was stated as follows:

$H17_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on receiving regular guidance from the bank supervisor concerning the governance and management of operational risk.

$H17_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of agreement on receiving regular guidance from the bank supervisor concerning the governance and management of operational risk.

The results of the Mann-Whitney U test are presented in Tables 7.40, 7.41 and 7.42.

Table 7.40: Descriptive statistic for H17

Implementation level of the Basel III operational risk management requirements	N	Mean	Median	Std. deviation	Min	Max
Not implemented	19	2.89	3.00	0.46	2.33	3.83
In the process	33	3.03	2.83	0.61	2.00	4.00

Source: Author (2020).

Table 7.41: Ranks for H17

Implementation level of the Basel III operational risk management requirements	N	Mean rank	Sum of ranks
Not implemented	19	25.00	475.00
In the process	33	27.36	903.00

Source: Author (2020).

Table 7.42: Test statistics for H17

Mann-Whitney U test results	
Mann-Whitney U	285.00
Wilcoxon W	475.00
z	-0.55
Asymptotic sig. (2-sided test)	0.59
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	-0.08

Source: Author (2020).

The results indicate that no statistically significant difference exists at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that are in the process of implementation *(Mdn = 2.83, n = 33)* and those that have not implemented *(Mdn = 3.00, n = 19)* the Basel III operational risk management requirements with regard to the level of agreement on receiving regular guidance from the bank supervisor concerning the

governance and management of operational risk U = 285.00, z = -0.55, p = 0.59. The p-value is greater than the chosen significance level of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that no difference exists in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and the level of agreement on receiving regular guidance from the bank supervisor concerning the governance and management of operational risk.

An absolute r-value of 0.08 represents a small effect size as $r < 0.10$, implying that the finding is of little practical importance (Field, 2013; Pallant, 2020).

7.3 Level of implementation of a risk culture

Section 7.3 is presented in three parts, namely:

- The level of implementation of a risk culture that encourages and supports operational risk management and the different operational risk management tools utilised to identify and assess operational risk (Section 7.3.1).
- The level of implementation of a risk culture that encourages and supports operational risk management and the benefit of operational risk management (Section 7.3.2).
- The level of implementation of a risk culture that encourages and supports operational risk management and the governance of operational risk (Section 7.3.3).

The analyses of the ordinal data included banks that have partially implemented a risk culture that encourages and supports operational risk management and banks that have fully implemented a risk culture that encourages and supports operational risk management. When analysing the surveyed banks' level of implementation of Basel III operational risk management requirements, the Mann-Whitney U test (H_{18} – H_{25}) was used to determine whether a statistically significant difference existed between the two groups of banks.

Before Sections 7.3.1 to 7.3.3 are presented, the following notes relating to the Mann-Whitney U test should be noted.

Notes regarding the Mann-Whitney U test:

- All the assumptions were met for the Mann-Whitney U test (Section 5.8.2.1).

General notes regarding the statistical analyses:

- All the hypotheses were tested at a 5% level of significance.
- Only cases with valid values on all the variables involved were included in the analyses.

7.3.1 Overall utilisation of operational risk management tools

The hypothesis regarding the level of implementation of a risk culture that encourages and supports operational risk management and the number of operational risk management tools they utilise to identify and assess operational risk was formulated as follows:

$H18_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and the number of operational risk management tools they utilise to identify and assess operational risk.

$H18_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and the number of operational risk management tools they utilise to identify and assess operational risk.

The results of the Mann-Whitney U test are presented in Tables 7.43, 7.44 and 7.45.

Table 7.43: Descriptive statistic for H18

Implementation level of a risk culture	N	Mean	Median	Std. deviation	Min	Max
Partially implemented	29	6.28	7.00	2.60	0	9
Fully implemented	25	6.68	7.00	1.70	3	9

Source: Author (2020).

Table 7.44: Ranks for H18

Implementation level of a risk culture	N	Mean rank	Sum of ranks
Partially implemented	29	27.43	795.50
Fully implemented	25	27.58	689.50

Source: Author (2020).

Table 7.45: Test statistics for H18

Mann-Whitney U test results	
Mann-Whitney U	364.50
Wilcoxon W	689.50
z	0.04
Asymptotic sig. (2-sided test)	0.97
Effect size: r ($\frac{z}{\sqrt[2]{N}}$)	0.01

Source: Author (2020).

The results indicate that there is no statistically significant difference at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that have fully implemented (*Mdn = 7.00, n = 25*) and those that have partially implemented (*Mdn = 7.00, n = 29)* a risk culture that encourages and supports operational risk management and the number of operational risk management tools they utilise to identify and assess operational risk U = 364.50, z = 0.04, p = 0.97. The p-value is greater than the chosen significance value of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that no difference exists in the surveyed Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and the number of operational risk management tools they utilise to identify and assess operational risk.

An absolute r-value of 0.01 represents a small effect size as r < 0.10, implying that the finding is of little practical importance (Field, 2013; Pallant, 2020).

7.3.2 The benefits of operational risk management

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the benefit of operational risk management. The hypothesis was stated as follows:

$H19_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the benefits of operational risk management.

$H19_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the benefits of operational risk management.

The results of the Mann-Whitney U test are presented in Tables 7.46, 7.47 and 7.48.

Table 7.46: Descriptive statistic for H19

Implementation level of a risk culture	N	Mean	Median	Std. deviation	Min	Max
Partially implemented	29	3.32	3.00	0.51	2	4
Fully implemented	25	3.23	3.33	0.49	2	4

Source: Author (2020).

Table 7.47: Ranks for H19

Implementation level of a risk culture	N	Mean rank	Sum of ranks
Partially implemented	29	28.20	789.50
Fully implemented	25	25.66	641.50

Source: Author (2020).

Table 7.48: Test statistics for H19

Mann-Whitney U test results	
Mann-Whitney U	316.50
Wilcoxon W	641.50
z	-0.62
Asymptotic sig. (2-sided test)	0.54
Effect size: r ($\frac{Z}{2\sqrt{N}}$)	-0.09

Source: Author (2020).

The results indicate that there is no statistically significant difference at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that have fully implemented (*Mdn = 3.33, n = 25*) and those that have partially implemented (*Mdn = 3.00, n = 29)* a risk culture that encourages and supports operational risk management and their level of agreement on the benefits of operational risk management U = 316.50, z = -0.62, p =

0.54. The p-value is greater than the chosen significance value of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that no statistically significant difference exists in the surveyed Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the benefits of operational risk management.

An absolute r-value of 0.09 represents a small effect size as $r < 0.10$, implying that the finding is of little practical importance (Field, 2013; Pallant, 2020).

7.3.3 The governance of operational risk

Hypotheses H_{20} – H_{25} were formulated to determine if a difference exists in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and different aspects relating to operational risk governance using the Mann-Whitney U test. The different operational risk governance aspects examined were:

- the extent to which operational risk monitoring and reporting procedures are in place,
- the utilisation of the 3LOD risk operating model,
- the influence of the compliance function on the board and senior management in terms of complying with the operational risk management regulations and standards,
- the efficiency and effectiveness of the internal audit function to assess operational risk management independently,
- the disclosure of risk exposures and risk management strategies, and
- the guidance received from the bank supervisor.

7.3.3.1 Monitoring and reporting

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and the extent to which they have monitoring and reporting procedures in place. The hypothesis was stated as follows:

$H20_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and the extent to which these banks have monitoring and reporting procedures in place.

$H20_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and the extent to which these banks have monitoring and reporting procedures in place.

The results of the Mann-Whitney U test are presented in Tables 7.49, 7.50 and 7.51.

Table 7.49: Descriptive statistic for H20

Implementation level of a risk culture	N	Mean	Median	Std. deviation	Min	Max
Partially implemented	29	3.29	3.20	0.43	2.00	4.00
Fully implemented	25	3.45	3.40	0.49	2.60	4.00

Source: Author (2020).

Table 7.50: Ranks for H20

Implementation level of a risk culture	N	Mean rank	Sum of ranks
Partially implemented	29	24.50	710.50
Fully implemented	25	30.98	774.50

Source: Author (2020).

Table 7.51: Test statistics for H20

Mann-Whitney U test results	
Mann-Whitney U	449.50
Wilcoxon W	774.50
z	1.54
Asymptotic sig. (2-sided test)	0.12
Effect size: r ($\frac{Z}{2\sqrt{N}}$)	0.21

Source: Author (2020).

The results indicate that there is no statistically significant difference at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that have fully implemented (*Mdn = 3.40, n = 25*) and those that have partially implemented (*Mdn = 3.20, n = 29)* a risk culture that encourages and supports operational risk management and the extent to which these banks have monitoring and reporting procedures in place U = 449.50, z =

1.54, p = 0.12. The p-value is greater than the chosen significance value of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can be stated that no statistically significant difference exists in the surveyed Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and the extent to which these banks have monitoring and reporting procedures in place.

An absolute r-value of 0.21 represents a medium effect size as r > 0.10 but < 0.3, implying that the finding is of medium practical importance (Field, 2013; Pallant, 2020).

7.3.3.2 The three lines of defence risk operating model

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk. The hypothesis was stated as follows:

$H21_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk.

$H21_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk.

The results of the Mann-Whitney U test are presented in Tables 7.52, 7.53 and 7.54.

Table 7.52: Descriptive statistic for H21

Implementation level of a risk culture	N	Mean	Median	Std. deviation	Min	Max
Partially implemented	29	3.43	3.50	0.61	2.00	4.00
Fully implemented	25	3.78	4.00	0.46	2.50	4.00

Source: Author (2020).

Table 7.53: Ranks for H21

Implementation level of a risk culture	N	Mean rank	Sum of ranks
Partially implemented	29	23.38	678.00
Fully implemented	25	32.28	807.00

Source: Author (2020).

Table 7.54: Test statistics for H21

Mann-Whitney U test results	
Mann-Whitney U	482.00
Wilcoxon W	807.00
z	2.39
Asymptotic sig. (2-sided test)	0.02
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	0.33

Source: Author (2020).

The results indicate that a statistically significant difference exists at the 5% level of significance (*p-value < 0.05*) between the surveyed banks that have fully implemented (*Mdn* = 4.00, n = 25) and those that have partially implemented (*Mdn = 3.50, n = 29)* a risk culture that encourages and supports operational risk management and their level of agreement on the utilisation of the 3LOD risk operating model for the management of operational risk U = 482.00, z = 2.39, p = 0.02. The p-value is smaller than the chosen significance value of 0.05. The null hypothesis can therefore be rejected.

To further investigate this statistically significant difference, the medians provided in Table 7.52 were considered. When examining these medians, it appears that the surveyed banks that have fully implemented a risk culture that encourages and supports operational risk management (*Mdn = 4.00)* tend to agree more strongly on utilising the 3LOD risk operating model for the management of operational risk in comparison to the surveyed banks that have a partially implemented *(Mdn = 3.50)* a risk culture that encourages and supports operational risk management.

It can therefore be stated that the surveyed banks that have a fully implemented risk culture that encourages and supports operational risk management are more aware of the benefits of utilising the 3LOD risk operating model in their operational risk management practices than those that indicated they have a partially implemented risk culture. The level of implementation of a risk culture can therefore have a positive effect on the utilisation of the 3LOD operating model with regard to the management of operational risk.

An absolute r-value of 0.33 represents a medium effect size as $r > 0.30$ but < 0.50, implying that the finding is of medium practical importance (Field, 2013; Pallant, 2020).

7.3.3.3 Compliance

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the compliance function advising the board and senior management about complying with regulations and standards on operational risk. The hypothesis was stated as follows:

$H22_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the compliance function advising the board and senior management about complying with regulations and standards on operational risk.

$H22_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on the compliance function advising the board and senior management about complying with regulations and standards on operational risk.

The results of the Mann-Whitney U test are listed in Tables 7.55, 7.56 and 7.57.

Table 7.55: Descriptive statistic for H22

Implementation level of a risk culture	N	Mean	Median	Std. deviation	Min	Max
Partially implemented	29	3.40	3.33	0.57	2.33	4.00
Fully implemented	25	3.65	4.00	0.50	2.33	4.00

Source: Author (2020).

Table 7.56: Ranks for H22

Implementation level of a risk culture	N	Mean rank	Sum of ranks
Partially implemented	29	24.41	708.00
Fully implemented	25	31.08	777.00

Source: Author (2020).

Table 7.57: Test statistics for H22

Mann-Whitney U test results	
Mann-Whitney U	452.00
Wilcoxon W	777.00
z	1.64
Asymptotic sig. (2-sided test)	0.10
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	0.22

Source: Author (2020).

The results indicate that there is no statistically significant difference at the 5% level of significance (*p-value > 0.05*) between the surveyed banks that have fully implemented (*Mdn = 4.00, n = 25*) and those that have partially implemented (*Mdn = 3.33, n = 29)* a risk culture that encourages and supports operational risk management and their level of agreement on the compliance function advising the board and senior management about complying with regulations and standards on operational risk U = 452.00, z = 1.64, p = 0.10. The p-value is greater than the chosen significance value of 0.05. The study therefore fails to reject the null hypothesis.

Consequently, the medians were not interpreted, and it can therefore be stated that no difference exists in the surveyed Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and the level to which these banks agree that their compliance function advises the board and senior management about complying with regulations and standards on operational risk.

An absolute r-value of 0.22 represents a medium effect size as r > 0.10 but < 0.3, implying that the finding is of medium practical importance (Field, 2013; Pallant, 2020).

7.3.3.4 Internal audit

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement that the internal audit function independently assesses the effectiveness and efficiency of operational risk management. The hypothesis was stated as follows:

$H23_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement that the internal audit function independently assesses the effectiveness and efficiency of operational risk management.

$H23_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement that the internal audit function independently assesses the effectiveness and efficiency of operational risk management.

The results of the Mann-Whitney U test are listed in Tables 7.58, 7.59 and 7.60.

Table 7.58: Descriptive statistic for H23

Implementation level of a risk culture	N	Mean	Median	Std. deviation	Min	Max
Partially implemented	29	3.24	3.00	0.47	2.50	4.00
Fully implemented	25	3.86	4.00	0.34	3.00	4.00

Source: Author (2020).

Table 7.59: Ranks of H23

Implementation level of a risk culture	N	Mean rank	Sum of ranks
Partially implemented	29	19.67	570.50
Fully implemented	25	36.58	914.50

Source: Author (2020).

Table 7.60: Test statistics for H23

Mann-Whitney U test results	
Mann-Whitney U	589.50
Wilcoxon W	914.50
z	4.40
Asymptotic sig. (2-sided test)	0.04
Effect size: r ($\frac{Z}{\sqrt{N}}$)	0.60

Source: Author (2020).

The results indicate that a statistically significant difference exists at the 5% level of significance (*p-value < 0.05*) between the surveyed banks that have fully implemented (*Mdn = 4.00, n = 25*) and those that have partially implemented (*Mdn = 3.00, n = 29)* a risk culture that encourages and supports operational risk management and their level of agreement that the internal audit function independently assesses the effectiveness and efficiency of operational risk management U = 589.50., z = 4.40, p = 0.04. The p-value is

smaller than the chosen significance value of 0.05. The null hypothesis can therefore be rejected.

To further investigate this statistically significant difference, the medians provided in Table 7.58 were considered. When assessing the medians, it appears that the surveyed banks that have fully implemented a risk culture that encourages and supports operational risk management (*Mdn = 4.00)* tend to agree more strongly that the internal audit function independently assesses the effectiveness and efficiency of operational risk management in comparison to those that have a partially implemented *(Mdn = 3.00)* risk culture that encourages and supports operational risk management.

It can therefore be stated that the surveyed banks with a fully implemented risk culture that supports operational risk management give the requisite attention to the internal audit function to independently assess the effectiveness and efficiency of operational risk management. The importance of risk culture to support the effective functioning of the internal audit function should not be overlooked by Ghanaian banks as it aids in assessing the effectiveness of operational risk management practices.

An absolute r-value of 0.60 represents a large effect size as r >0.50, implying that the finding is of high practical importance (Field, 2013; Pallant, 2020).

7.3.3.5 Disclosure and transparency

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on disclosing key points concerning their risk exposures and risk management strategies with regard to the management of operational risk. The hypothesis was stated as follows:

$H24_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on disclosing key points concerning their risk exposures and risk management strategies with regard to the management of operational risk.

$H24_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on disclosing key points concerning their risk exposures and risk management strategies with regard to the management of operational risk.

The results of the Mann-Whitney U test are listed in Tables 7.61, 7.62 and 7.63.

Table 7.61: Descriptive statistic for H24

Implementation level of a risk culture	N	Mean	Median	Std. deviation	Min	Max
Partially implemented	29	3.14	3.00	0.49	2.50	4.00
Fully implemented	25	4.42	3.50	0.55	2.00	4.00

Source: Author (2020).

Table 7.62: Ranks for H24

Implementation level of a risk culture	N	Mean rank	Sum of ranks
Partially implemented	29	22.96	585.50
Fully implemented	25	31.52	899.50

Source: Author (2020).

Table 7.63: Test statistics for H24

Mann-Whitney U test results	
Mann-Whitney U	463.00
Wilcoxon W	788.00
z	2.09
Asymptotic sig. (2-sided test)	0.04
Effect size: r ($\frac{Z}{\sqrt[2]{N}}$)	0.29

Source: Author (2020).

The results indicate that a statistically significant difference exists at the 5% level of significance (*p-value < 0.05*) between the surveyed banks that have fully implemented (*Mdn = 3.50, n = 25*) and those that have partially implemented (*Mdn = 3.00, n = 29)* a risk culture that encourages and supports operational risk management and their level of agreement on disclosing key points concerning their risk exposures and risk management strategies with regard to the management of operational risk U = 463, z = 2.09, p = 0.04. The p-value is smaller than the chosen significance value of 0.05. The null hypothesis can therefore be rejected.

To further investigate this statistically significant difference, the medians provided in Table 7.61 were considered. When reviewing the medians, it appears that the surveyed banks that have fully implemented a risk culture that encourages and supports operational risk management (*Mdn = 3.50)* tend to agree more strongly that they disclose their risk exposures and risk management strategies with regard to the management of operational risk in comparison to those that have a partially implemented *(Mdn = 3.00)* risk culture that encourages and supports operational risk management.

It can be concluded that the surveyed banks that have a fully implemented risk culture that encourages and supports operational risk management, strongly agree that they disclose their risk exposures and risk management strategies with regard to the management of operational risk. A strong risk culture which supports operational risk exposures may have allowed banks with a fully implemented risk culture to address these risks proactively, at an early stage, and to develop risk management strategies to mitigate/limit the adverse impact of these risks.

An absolute r-value of 0.29 represents a medium effect size as r >0.10 but < 0.30, implying that the finding is of medium practical importance (Field, 2013; Pallant, 2020).

7.3.3.6 Bank supervision

A hypothesis was formulated to determine if a statistically significant difference exists in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on receiving regular guidance from the bank supervisor with regard to the governance and management of operational risk. The hypothesis was stated as follows:

$H25_0$: There is no statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on receiving regular guidance from the bank supervisor with regard to the governance and management of operational risk.

$H25_a$: There is a statistically significant difference in Ghanaian banks between their level of implementation of a risk culture that encourages and supports operational risk management and their level of agreement on receiving regular guidance from the bank supervisor with regard to the governance and management of operational risk.

The results of the Mann-Whitney U test are listed in Tables 7.64, 7.65 and 7.66.

Table 7.64: Descriptive statistic for H25

Implementation level of a risk culture	N	Mean	Median	Std. deviation	Min	Max
Partially implemented	29	2.70	2.50	0.50	2.00	4.00
Fully implemented	25	3.24	3.20	0.54	2.00	4.00

Source: Author (2020).

Table 7.65: Ranks for H25

Implementation level of a risk culture	N	Mean rank	Sum of ranks
Partially implemented	29	20.19	585.50
Fully implemented	25	35.98	899.50

Source: Author (2020).

Table 7.66: Test statistics for H25

Mann-Whitney U test results	
Mann-Whitney U	574.50
Wilcoxon W	899.50
z	3.72
Asymptotic sig. (2-sided test)	0.00
Effect size: r ($\frac{z}{\sqrt[2]{N}}$)	0.51

Source: Author (2020).

The results indicate that a statistically significant difference exists at the 5% level of significance (*p-value < 0.05*) between the surveyed banks that have fully implemented (*Mdn = 3.20, n = 25*) and those that have partially implemented (*Mdn =2.50, n = 29)* a risk culture that encourages and supports operational risk management and their level of agreement on receiving regular guidance from the bank supervisor with regard to the governance and management of operational risk U = 574.50, z = 3.71, p = 0.00. The p-value is smaller than the chosen significance value of 0.05. The null hypothesis can therefore be rejected.

To further investigate this statistically significant difference, the medians provided in Table 7.61 were considered. When assessing the medians, it appears that the surveyed banks that have fully implemented a risk culture that encourages and supports operational risk management (*Mdn = 3.20)* tend to agree more strongly that they receive regular guidance from the bank supervisor with regard to the governance and management of operational risk in comparison to those that have a partially implemented *(Mdn = 2.50)* risk culture.

An absolute r-value of 0.51 represents a large effect size as r > 0.50, implying that the finding is of high practical importance (Field, 2013; Pallant, 2020).

7.4 Level of implementation of the Basel III operational risk management requirements and the level of implementation of a risk culture that supports and promotes the management of operational risk

Section 7.4 presents one hypothesis to determine whether there is a statistically significant association in Ghanaian banks between their implementation of Basel III's operational risk management requirements and the level of implementation of a risk culture that supports and promotes the management of operational risk. Fisher's exact test was employed to test the hypothesis.

Notes regarding the Fisher exact test:

- All the assumptions were met for the Fisher exact test (Section 5.8.2.2).

General notes regarding the statistical analyses:

- All the hypotheses were tested at a 5% level of significance.
- For ease of reporting the inferential statistical results, the shortened term "Basel III" is used instead of "Basel III regulatory framework".
- Only cases with valid values on all the variables involved were included in the analysis.

The hypothesis regarding the level of implementation of the Basel III operational risk management requirements and the level of implementation of a risk culture was formulated as follows:

$H26_0$: There is no statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of implementation of a risk culture that encourages and supports operational risk management.

$H26_a$: There is a statistically significant association in Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of implementation of a risk culture that encourages and supports operational risk management.

The results of Fisher's exact test are presented in Tables 7.67, 7.68 and 7.69.

Table 7.67: Crosstabulation of the level of implementation of a risk culture

Level of implementation of a risk culture		Basel III		
		Not implemented	In the process	Total
Partially implemented	Frequency	11	19	30
	Percentage (%)	57.9%	52.8%	54.5%
Fully implemented	Frequency	8	17	25
	Percentage (%)	42.1%	47.2%	45.5%
Total	Frequency	19	36	55
	Percentage (%)	100.00%	100.00%	100.00%

Source: Author (2020).

Table 7.68: Fisher's exact test: Level of implementation of a risk culture

Level of implementation of a risk culture	Value	df	p-value
Pearson chi-square	0.13	1	0.72
Fisher's exact test			0.78

Source: Author (2020).

The results indicate that there is no statistically significant association at the 5% level of significance (*p-value > 0.05*) between the level of implementation of the Basel III operational risk management requirements and the level of implementation of a risk culture that encourages and supports operational risk management among the surveyed Ghanaian banks $x^2(1, 55) = 0.13$, $p = 0.78$. The study therefore fails to reject the null hypothesis.

It can therefore be stated that no association exists in the surveyed Ghanaian banks between their level of implementation of the Basel III operational risk management requirements and their level of implementation of a risk culture that encourages and supports operational risk management.

7.5 Multiple regression analyses

As stated in the introduction of the chapter, Section 7.5 presents the analyses of three multiple regressions (see Appendix D). The first multiple regression investigated whether the total number of operational risk management tools utilised (OP) by the surveyed Ghanaian banks and their level of implementation of the Basel III operational risk management requirements (BS) could predict the level of agreement on the perceived benefit of operational risk management (PB).

The second multiple regression investigated whether the level of implementation of the operational risk management requirements of Basel III (BS) and the level of

implementation of a risk culture that encourages and supports operational risk management (RC) could predict the level of agreement on the perceived benefit of operational risk management (PB) among the surveyed Ghanaian banks.

The third multiple regression analysis investigated whether the level of implementation of the Basel III operational risk management requirements (BS) and the level of implementation of a risk culture that encourages and supports operational risk management (RC) could predict if the surveyed Ghanaian banks are transparent and disclose operational risk management information (DT).

Notes regarding the multiple regression analyses of data:

- All the hypotheses were tested on a 5% level of significance.
- For ease of reporting on the multiple regression analyses, the dependent and independent variables are coded as follows:

Table 7.69 Coding of independent and dependent variables

Independent variable	Code
Total number of operational risk management tools utilised.	OP
Level of implementations of the Basel III operational risk management requirements.	BS
Level of implementation of a risk culture that encourages and supports operational risk management.	RC
Dependent variable	
The perceived benefit of operational risk management.	PB
Disclosure and transparency of operational risk.	DT

Source: Author (2020).

- Two of the categorical independent variables were dummy-coded[47]: BS and RC.
- All the assumptions for multiple regression analyses were met (Section 5.8.2.3).

7.5.1 Multiple regression model 1

The first multiple regression investigated whether the total number of operational risk management tools utilised by the surveyed Ghanaian banks (OP) and their level of implementation of the Basel III operational risk management requirements (BS) could predict the level of agreement on the perceived benefit of operational risk management (PB):

$PB = \beta_0 + \beta_1(BS) + \beta_2(OP)$

To construct the hypothesis, OP was obtained by adding all the positive responses for the utilisation of different operational risk management tools: audit findings, internal loss data collection and analysis, external data collection, risk assessments, business process mapping, risk and performance indicators, scenario analysis, stress testing and comparative analysis. The descriptive statistic for OP is presented in Table 6.70:

Table 7.70: Descriptive statistics: OP

N	Min	Max	Mean	Std. deviation
70	0	9	6.66	2.19

Source: Author (2020).

The hypothesis was formulated as follows:

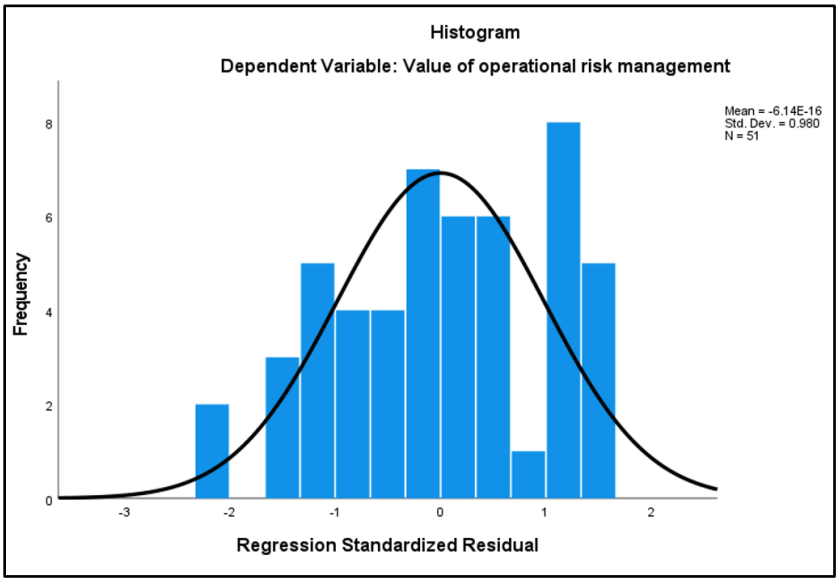
$H27_0$: OP and BS do not significantly predict PB.

[47] Dummy coding enabled a single regression equation to represent multiple groups.
BS was dummy coded to comprise two categories: *not implemented* and *in the process*. RC was dummy coded so that it comprised the two categories: *partially implemented* and *fully implemented*.

$H27_a$: OP and BS significantly predict PB.

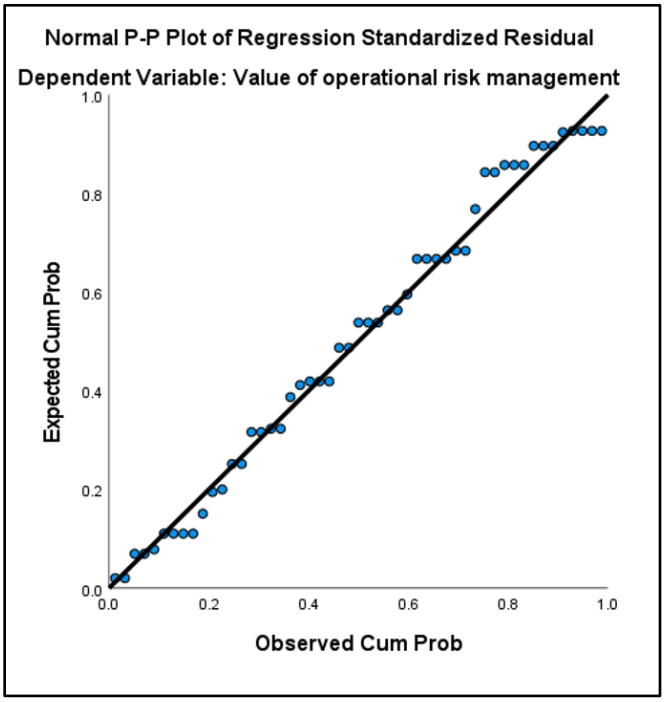
Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, homoscedasticity, independence of residuals and multicollinearity. The assumption to test for normality of residuals is depicted in Figure 7.1 below. This figure indicates that residuals were normally distributed, with no influential outliers. The assumption relating to linearity was found to hold as illustrated in Figure 7.2 below − which indicates a straight-line relationship between the independent and dependent variables. The assumption relating to homoscedasticity is presented in Figure 7.3, which found that no pattern exists between the data points presented by the scatter plot, with no distinct outliers detected. Multicollinearity between the independent variables do not exist as the multicollinearity diagnostics are within acceptable limits (VIF = 1.16; tolerance statistic = 0.86). Independence of residuals are within acceptable limits as the Durbin-Watson statistic was calculated at 1.42.

Figure 7.1: Normality of residuals



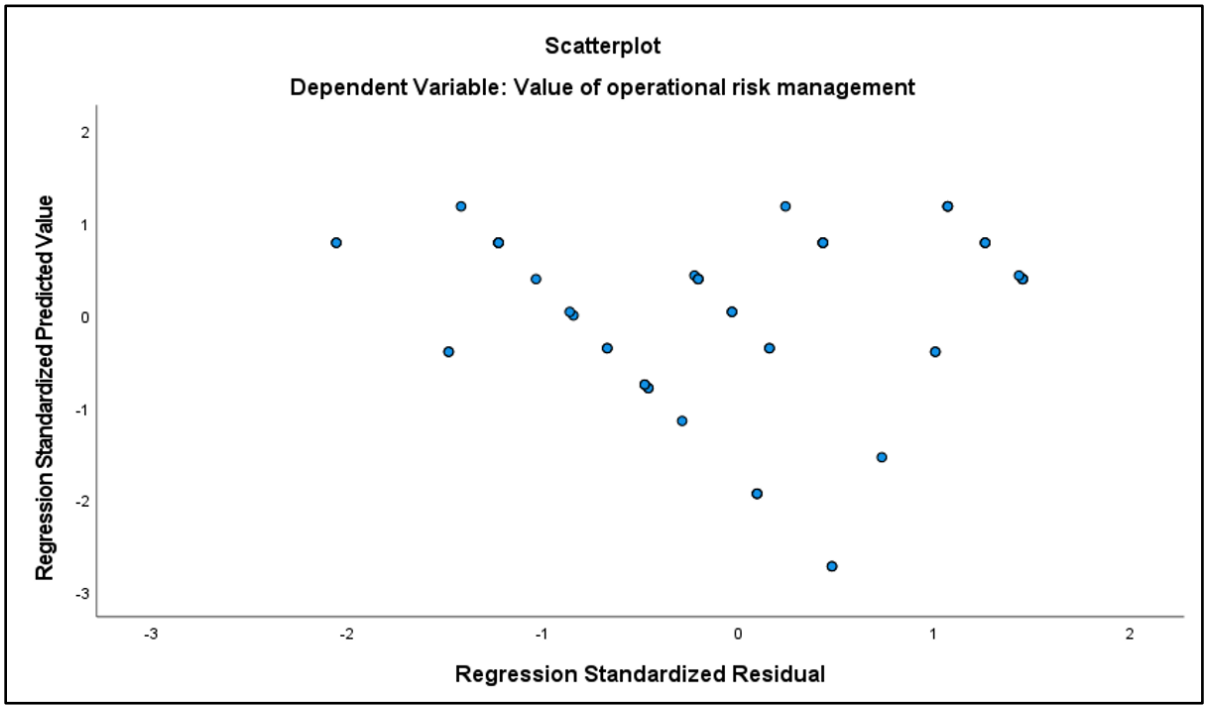
Source: Author (2020).

Figure 7.2: Linearity



Source: Author (2020).

Figure 7.3: Homoscedasticity



Source: Author (2020).

The results of the multiple regression analyses are presented in Tables 7.71 to 7.73.

Table 7.71: Model summary[b]

R	R square	Adjusted R square	Std. error of estimate	Durbin-Watson
0.44a	0.20	0.16	0.40	1.42

Source: Author (2020).

a. Predictors: (Constant), Total operational risk management tools, Basel III implementation

b. Dependent variable: Perceived benefit of operational risk management

Table 7.72: ANOVA[a]

	Sum of squares	Df	Mean square	F	Sig.
Regression	1.90	2	0.95	5.88	0.01b
Residual	7.76	48	0.16		
Total	9.66	50			

Source: Author (2020).

a. Predictors (Constant): Total operational risk management tools, Basel III implementation

b. Dependent variable: Perceived benefit of operational risk management

Table 7.73: Coefficients[a]

Variable	Unstandardised coefficients		Standardised coefficients	t	Sig.	Collinearity statistics	
	B	Std. error	Beta			Tolerance	VIF
(Constant)	2.73	0.19		14.04	0.00		
BS	0.15	0.13	0.16	1.15	0.26	0.86	1.16
OP	0.08	0.03	0.36	2.57	0.01	0.86	1.16

Source: Author (2020).

a. Dependent variable: Perceived benefit of operational risk management

The ANOVA table (see Table 7.72) illustrate that the model is statistically significant F (2, 48) = 5.88, p=0.01. The combination of independent variables (OP, BS) explains a total of 20% of the variance in the dependent variable (PB). An inspection of the coefficients in Table 7.73 indicates that only OP (B = 0.08, p = 0.01) is a significant predictor of PB. BS (B = 0.15, p =0.26) is not a significant indicator of PB. The sign of the B coefficient further suggests that an increase in the total number of risk management tools utilised by the surveyed Ghanaian banks will result in a higher score in the perceived value of operational risk management. It can therefore be stated that if the surveyed Ghanaian banks utilise more of the operational risk management tools to identify and assess operational risk, increased benefits of effective operational risk management will be achieved.

The final predictive model is thus:

PB = 2.73 + (0.15*BS) + (0.08*OP)

7.5.2 Multiple regression model 2

The second multiple regression investigated whether the level of implementation of the Basel III operational risk management requirements (BS) and the level of implementation of a risk culture that encourages and supports operational risk management could predict (RC) the level of agreement on the perceived benefit of operational risk management among the surveyed Ghanaian banks (PB):

$PB = \beta_0 + \beta_1(RC) + \beta_2(BS)$

The hypothesis was formulated as follows:

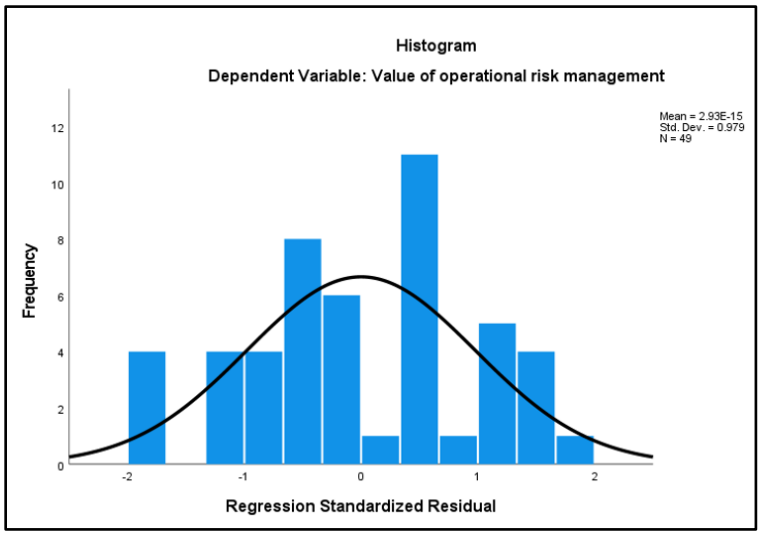
$H28_0$: BS and RC do not significantly predict PB.

$H28_a$: BS and RC significantly predict PB.

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, homoscedasticity, independence of residuals and multicollinearity. The assumption to test for normality of residuals is depicted in Figure 7.4 below. This

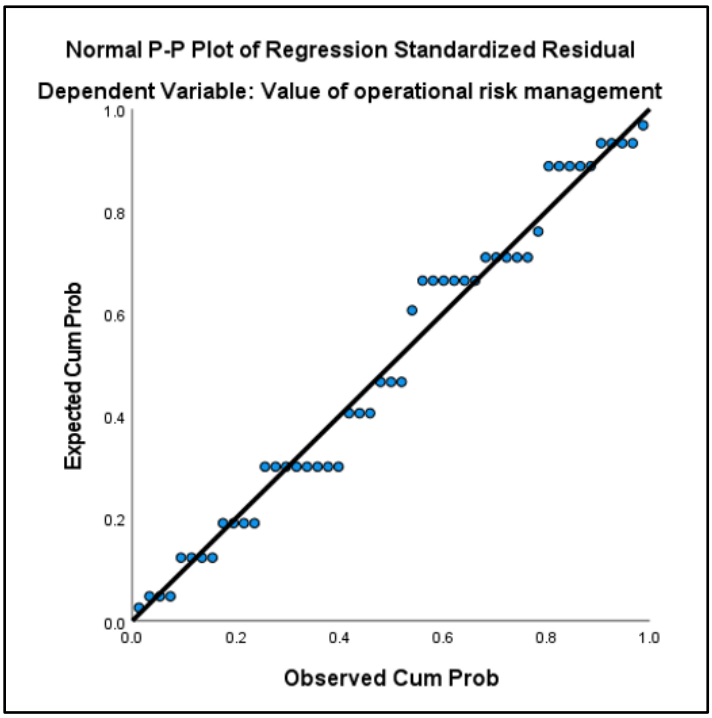
indicates that residuals are normally distributed, with no influential outliers. The assumption relating to linearity was found to hold as illustrated in Figure 7.5 below, which indicates a straight-line relationship between the independent and dependent variables. The assumption relating to homoscedasticity is presented in Figure 7.6, which found that no distinct pattern exists between the data points in the scatter plot, with no distinct outliers detected. Multicollinearity between the independent variables do not exist as the multicollinearity diagnostics are within acceptable limits (VIF =1.00; tolerance statistic = 0.99). Independence of residuals are within acceptable limits as the Durbin-Watson statistic was calculated at 1.52.

Figure 7.4: Normality of residuals



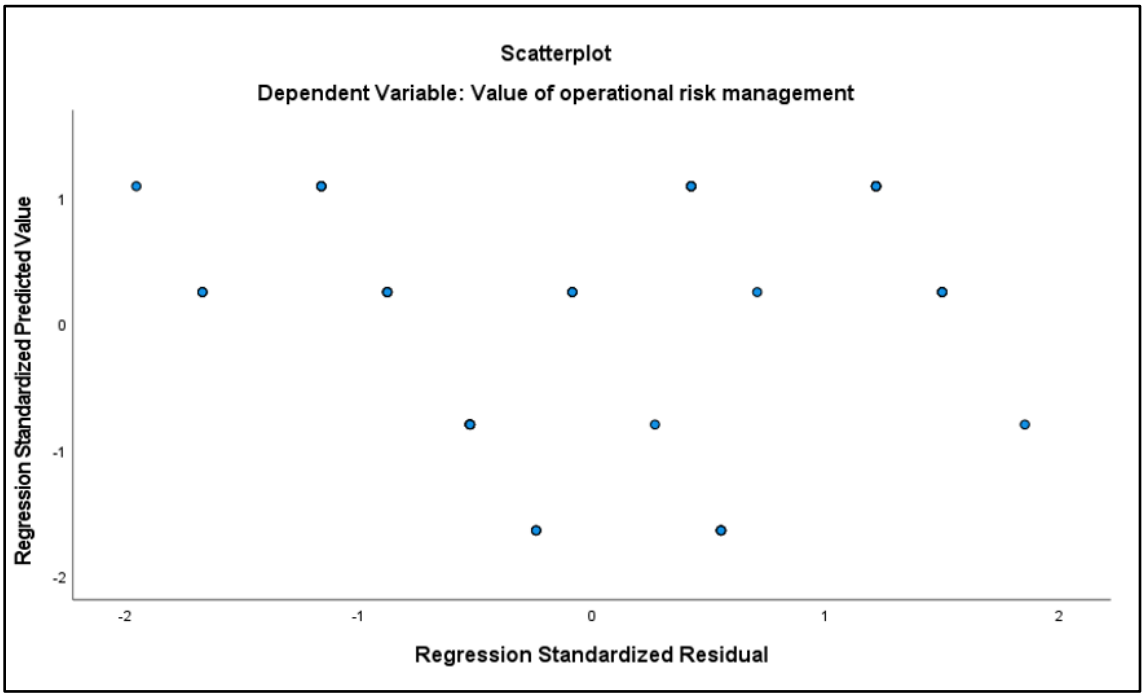
Source: Author (2020).

Figure 7.5: Linearity



Source: (2020).

Figure 7.6: Homoscedasticity



Source: (2020).

The results of the multiple regression analyses are presented in Tables 7.74 to 7.76.

Table 7.74: Model summary[b]

R	R square	Adjusted R square	Std. error of estimate	Durbin-Watson
0.33a	0.11	0.07	0.42	1.52

Source: Author (2020).

a. Predictors (Constant): Risk culture, Basel III implementation

b. Dependent variable: Perceived benefit of operational risk management

Table 7.75: ANOVA[a]

	Sum of squares	Df	Mean square	F	Sig.
Regression	0.96	2	0.48	2.72	0.043b
Residual	8.15	46	0.18		
Total	9.11	48			

Source: Author (2020).

a. Predictors (Constant): Risk culture, Basel III implementation

b. Dependent variable: Perceived benefit of operational risk management

Table 7.76: Coefficients[a]

Variable	Unstandardised coefficients		Standardised coefficients	t	Sig.	Collinearity statistics	
	B	Std. error	Beta			Tolerance	VIF
Constant	3.22	0.11		28.56	0.000		
RC	0.27	0.13	0.30	2.15	0.04	0.99	1.00
BS	-0.12	0.12	-0.14	-0.10	0.33	0.99	1.00

Source: Author (2020).

a. Dependent variable: Perceived benefit of operational risk management

The ANOVA table (see Table 7.75) shows that the model is statistically significant F (2, 46) = 2.72, p=0.043. The combination of independent variables (RC, BS) explains a total of 11% of the variance in the dependent variable (PB). The review of the coefficients in Table 7.76 indicates that only RC is a significant predictor of PB (B = 0.27, p = 0.04). In contrast, BS (B = -0.12, p = 0.33) is not a significant indicator. The sign of the B coefficient further suggests that an increase in RC will result in a higher score in PB. It can therefore be stated that if the surveyed Ghanaian banks increase their level of implementation of a risk culture that encourages and supports operational risk management, a higher perceived value of operational risk management will be achieved.

The final predictive model is thus:

PB = 3.22 + (0.27*RC) + (-0.12*BS)

7.5.3 Multiple regression model 3

The third multiple regression analysis investigated whether the level of implementation of the Basel III operational risk management requirements and the level of implementation of a risk culture that encourages and supports operational risk management could predict the disclosure and transparency of operational risk management information by surveyed Ghanaian banks:

$DT = \beta_0 + \beta_1(BS) + \beta_2(RC)$

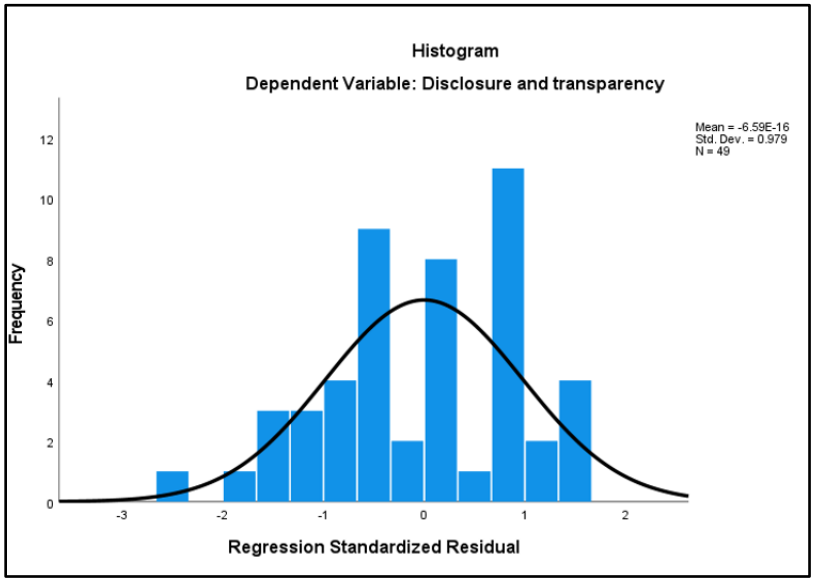
The hypothesis was formulated as follows:

$H29_0$: BS and RC do not significantly predict DT.

$H29_a$: BS and RC significantly predict DT.

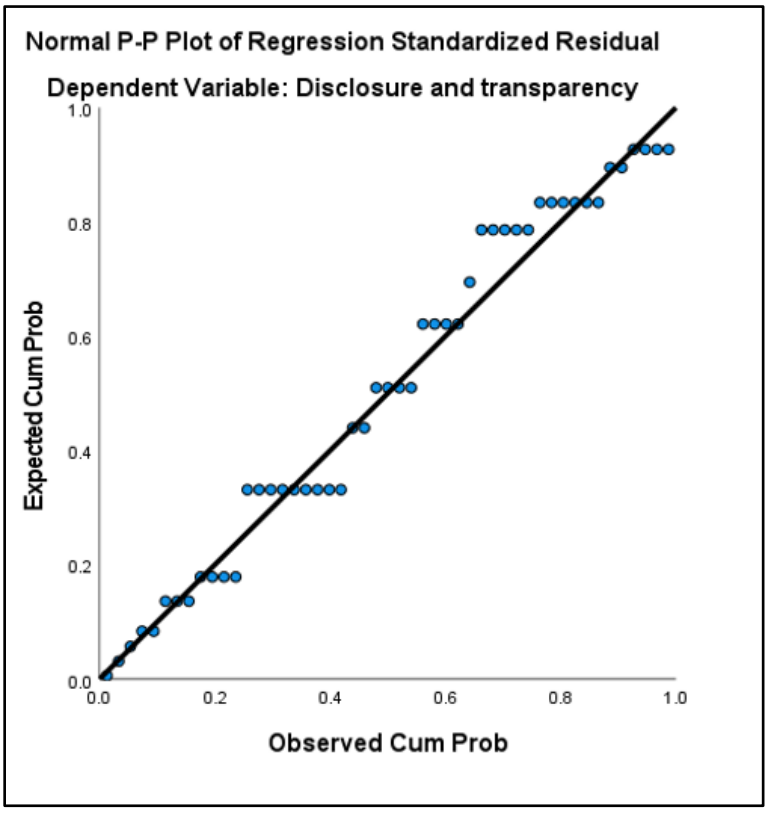
Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, homoscedasticity, independence of residuals and multicollinearity. The assumption to test for normality of residuals is depicted in Figure 7.7 below. This indicates that residuals are normally distributed, with no influential outliers. The assumption relating to linearity was found to hold as illustrated in Figure 7.8 below, which indicates a straight-line relationship between the independent and dependent variables. The assumption relating to homoscedasticity is presented in Figure 7.9, which found that no distinct pattern exists between the data points in the scatter plot, with no distinct outliers detected. Multicollinearity between the independent variables do not exist as the multicollinearity diagnostics are within acceptable limits (VIF =1.00; tolerance statistic =1.00). Independence of residuals are within acceptable limits as the Durbin-Watson statistic was calculated at 1.49.

Figure 7.7: Normality of residuals



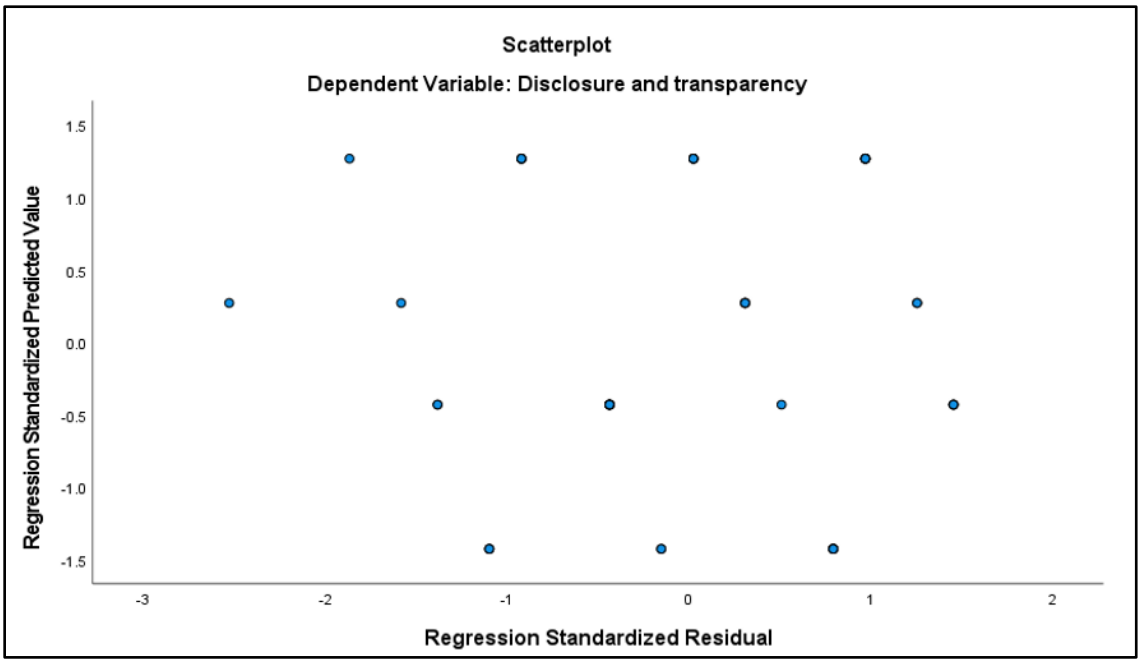
Source: Author (2020).

Figure 7.8: Linearity



Source: Author (2020).

Figure 7.9: Homoscedasticity



Source: Author (2020).

The results of the multiple regression analyses are presented in Tables 7.77 to 7.79.

Table 7.77: Model summary[b]

R	R square	Adjusted R square	Std. error of estimate	Durbin-Watson
0.28a	0.08	0.04	0.53	1.49

Source: Author (2020).

a. Predictors (Constant): Risk culture, Basel III implementation

b. Dependent variable: Perceived benefit of operational risk management

Table 7.78: ANOVA[a]

	Sum of squares	Df	Mean square	F	Sig.
Regression	1.09	2	0.55	1.95	0.02
Residual	12.87	46	0.28		
Total	13.96	48			

Source: Author (2020).

a. Predictors (Constant): Risk culture, Basel III implementation

b. Dependent variable: Disclosure and transparency

Table 7.79: Coefficients[a]

Variable	Unstandardised coefficients		Standardised coefficients	t	Sig.	Collinearity statistics	
	B	Std. error	Beta			Tolerance	VIF
Constant	3.08	0.14		21.74	0.00		
BS	0.15	0.16	0.136	0.96	0.34	1.00	1.00
RC	0.26	0.15	0.240	1.70	0.04	1.00	1.00

Source: Author (2020).

a. Dependent variable: Disclosure and transparency

The ANOVA table (see Table 7.78) shows that the model is statistically significant F (2, 46) = 1.95, p=0.02. The combination of independent variables (RC, BS) explains a total of 8% of the variance in the dependent variable (DT). The review of the coefficients in Table 7.79 indicates that only RC is a significant predictor of DT (B =0.26, p =0.04). In contrast, BS (B = 0.15, p =0.34) is not a significant indicator. The sign of the B coefficient further suggests that an increase in RC will result in a higher score in DT. It can therefore be stated that if the surveyed Ghanaian bank increase their level of implementation of a risk culture that encourages and supports operational risk management, their disclosure and transparency of operational risk management information will be improved.

The final predictive model is thus:

DT = 3.08+ (0.15*BS) + (0.26*RC)

7.6 Summary

This chapter presented the results of the inferential statistical analyses conducted on the primary data. The empirical findings obtained regarding the operational risk management practices, risk governance practices and the implementation of a risk culture of the surveyed Ghanaian banks supported the primary and secondary objectives of the study.

It was determined that the number of operational risk management tools utilised to identify and assess operational risk by the surveyed Ghanaian banks differ based on the level of implementation of Basel III's operational risk management requirements. More specifically, it was found that those Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III are more likely than those that have not started the process to utilise the following tools to identify and assess operational risk: audit findings, external data collection, risk assessments, and risk and performance indicators.

No association was found between the surveyed Ghanaian banks that are in the process of implementing the Basel III operational risk requirements and those that have not implemented the Basel III operational risk requirements regarding the following: utilisation

of internal loss data collection and analysis, business process mapping, scenario analysis, comparative analysis and stress testing.

It was also established that the level of agreement on the benefit of operational risk management differs based on the level of implementation of Basel III's operational risk requirements at the surveyed Ghanaian banks. The banks that are in the process of implementing Basel III's operational risk requirements agreed more that operational risk management is beneficial in reducing the profit and loss volatility of its operations, freeing up capital and serving as a competitive advantage.

When considering the governance of operational risk, it was established that there is no difference in terms of the level of implementation of the Basel III operational risk requirements and the level to which the surveyed Ghanaian banks agree to utilise the following: monitoring and reporting procedures, the 3LOD risk operating model for the management of operational risk, the influence of the compliance function on the board and senior management in terms of complying with the operational regulations and standards, the efficiency and effectiveness of the internal audit function to assess operational risk management independently, the disclosure of risk and risk management strategies regarding the management of operational risk and the guidance received from the bank supervisor relating to the governance and management of operational risk.

Another finding was that the total number of operational risk management tools utilised to identify and assess operational risk by the surveyed Ghanaian banks did not differ based on the level of implementation of a risk culture that encourages and supports operational risk management. These operational risk management tools are: audit findings, internal loss data collection and analysis, external data collection and analysis, risk assessments, business process mapping, risk and performance indicators scenario analysis, comparative analysis and stress testing.

It was found that the surveyed Ghanaian banks' level of agreement on the benefit of operational risk management did not differ based on the level of implementation of a risk culture that encourages and supports operational risk management.

When considering the governance of operational risk at the surveyed Ghanaian banks, it was established that there is a difference in terms of their level of implementation of a risk culture that encourages and supports operational risk management and the level to which they agree to utilise the following tools: the 3LOD risk operating model, the internal audit function, the disclosure of risk and risk management strategies, and the guidance received from the bank supervisor. However, it was found that the governance of operational risk did not differ among the surveyed Ghanaian banks based on their implementation of a risk culture and the following two issues: (1) whether they have monitoring and reporting procedures in place, and (2) how the compliance function influences the board of directors and senior management in terms of complying with operational laws and standards.

No association exists in the surveyed Ghanaian banks between the level of implementation of the Basel III operational risk management requirements and the level of implementation of a risk culture that encourages and supports operational risk management.

From the three multiple regression analyses conducted, it was determined that:

- A higher perceived benefit of operational risk management is achieved when the surveyed Ghanaian banks utilise more operational risk management tools to identify and assess operational risk.
- A higher perceived value of operational risk management is achieved if the surveyed Ghanaian banks increase their level of implementation of a risk culture that encourages and supports operational risk management.
- The disclosure and transparency of operational risk management information will be improved when the surveyed Ghanaian banks increase their level of implementation of a risk culture that encourages and supports operational risk management.

The final chapter of this study will be presented next. Chapter 8 outlines the literature findings made throughout Chapters 2, 3 and 4, whereafter the empirical findings in Chapters 6 and 7 will be presented. These literature and empirical findings form the

foundation for the guidelines to Ghanaian banks to enhance their compliance with the operational risk management requirements of the Basel III regulatory framework.

Chapter 8- Summary, recommendations, and conclusions

8.1 Introduction

The purpose of the final chapter is to come to synthesis and to present guidelines that could assist Ghanaian banks in enhancing their compliance with the Basel III regulatory framework requirements regarding operational risk management. Consequently, Chapter 8 answers the primary research question formulated in Chapter 1, namely:

How can Ghanaian banks be assisted in increasing their level of operational risk management compliance with the Basel III regulatory framework?

In Chapter 1, it was stated that adopting the operational risk management requirements prescribed by the Basel regulatory frameworks will significantly assist in mitigating the ongoing challenges within the Ghanaian banking sector. Since operational risk is embedded in every fibre of a bank, Ghanaian banks were advised to focus specifically on improving their operational risk management practices and to implement the Basel III regulatory framework requirements concerning operational risk management. In order to assist in this endeavour, the following primary research objective was formulated:

PRO: To develop guidelines for Ghanaian banks to enhance their level of operational risk management compliance with the Basell III regulatory framework.

In order to address the primary research objective, the following 15 secondary research objectives were formulated:

SRO_1: To obtain a theoretical perspective on uncertainty, risk, risk management and ERM.

SRO_2: To establish the importance of risk management from a banking perspective.

SRO_3: To establish the importance of bank regulation by examining the role of the BIS and the BCBS.

SRO_4: To examine concepts essential to the successful operation of banking institutions.

SRO_5: To obtain a broad overview of the Basel I-, Basel II- and Basel III regulatory frameworks.

SRO_6: To investigate the purpose and improvements of each pillar of the three Basel regulatory frameworks.

SRO_7: To obtain a thorough understanding of how operational risk management is addressed by the regulatory frameworks and ought to be managed by banking institutions.

SRO_8: To identify and analyse each regulatory framework's strengths and weaknesses.

SRO_9: To obtain a comprehensive perspective and understanding of operational risk and its management in a banking context.

SRO_{10}: To examine the importance of risk culture and risk governance in banks.

SRO_{11}: To investigate the interdependence and interconnectedness of banks' risk culture- and risk governance practices to promote effective operational risk management in banking institutions.

SRO_{12}: To obtain general information on the respondents and Ghanaian banks.

SRO_{13}: To investigate the operational risk management practices of Ghanaian banks.

SRO_{14}: To explore the risk governance practices of Ghanaian banks.

SRO_{15} To assess the implementation of a risk culture in Ghanaian banks.

This chapter is structured to present the literature findings made in Chapters 2, 3 and 4; whereafter the focus shifts to the empirical findings of Chapters 6 and 7. Section 8.3 presents the guidelines developed to assist Ghanaian banks in enhancing their compliance with the Basel III regulatory framework requirements regarding operational risk management. The chapter concludes by providing recommendations for future

research and discussing the study's limitations. The chapter closes with a final word from the researcher.

8.2 Literature findings

The literature review for the study was presented in three separate chapters. The secondary research objectives, a synopsis and the key literature findings for Chapters 2, 3 and 4 are presented in the section below.

8.2.1 Chapter 2

In Table 8.1, the secondary research objectives, a synopsis and the key literature findings of Chapter 2 is presented.

Table 8.1: Secondary research objectives, synopsis and key findings of Chapter 2

Secondary research objectives addressed in Chapter 2:
The following research objectives were addressed in Chapter 2: • To obtain a theoretical perspective on uncertainty, risk, risk management and ERM (SRO_1). • To establish the importance of risk management from a banking perspective (SRO_2). • To establish the importance of bank regulation by examining the role of the BIS and the BCBS (SRO_3). • To examine concepts essential to the successful operation of banking institutions (SRO_4).
Synopsis of Chapter 2:
Banking systems are complex and have a considerable impact on the economic growth, sustainability, stability, evolution, and maturity of the global economy. Banking institutions are, however, confronted by ever-changing volatile business environments and continuously challenged by a broad spectrum of risks, where accurate and timely decision-making is of paramount importance. Therefore, banks are obliged to acknowledge and understand the significance of effective risk management, its vital role in safeguarding and advancing their own financial stability

and the critical role they play in promoting the financial stability and resilience of a country and the global economy.

However, banks and banking systems do not always operate in an effective, beneficial manner and, at times, are unsuccessful in achieving their objectives and therefore require guidance from regulatory and supervisory authorities. The BIS was created to assist central banks and other financial authorities worldwide in building an improved understanding of the universal economy, fostering international cooperation, and supporting them in achieving global monetary and financial stability. Since its founding, the BIS has formed numerous standing committees to maintain a balance between attending to short-term, conjunctural issues and exploring strategic themes for central banks and regulatory authorities in pursuing financial stability. The most influential of these committees has been the BCBS, responsible for publishing numerous banking regulations and supervisory guidelines. Among these publications are the Basel regulatory frameworks, which were developed to advance financial stability and improve the quality of banking supervision on a global scale. The successful operation of banking institutions is complex. Therefore, vital concepts relating to the successful functioning of banks were discussed, which included: distinguishing between regulatory- and economic capital, differentiating between borrowed- and unborrowed money in banking, and exploring liquidity, solvency, ALM, stress testing and securitisation in a banking context. It became clear that banking regulation and risk management are critical to banks' risk-taking behaviour, competitiveness and financial stability.

Literature findings of Chapter 2:

- Banks are complex and continuously challenged by a broad spectrum of risks (LF_1).
- Risk management enables banks to remain competitive and achieve their objectives (LF_2).
- Banks should adopt and implement a holistic approach to risk management that is dynamic, comprehensive, inclusive and proactive (LF_3).

- Effective risk management plays a critical role in banks' financial performance and financial stability and their ability to promote the financial stability of the global economy (LF_4).
- Guidance from regulatory- and supervisory authorities is critical to ensure that banks continue to operate effectively and efficiently and constructively contribute to the financial stability and resilience of national- and international financial systems (LF_5).

Source: Author (2022).

8.2.2 Chapter 3

Table 8.2 presents the secondary research objectives, a synopsis and key literature findings from Chapter 3.

Table 8.2: Secondary research objectives, synopsis and key findings of Chapter 3

Secondary research objectives addressed in Chapter 3:
The following secondary research objectives were addressed in Chapter 3: • To obtain a broad overview of the Basel I-, Basel II- and Basel III regulatory frameworks (SRO_5). • To investigate the purpose and improvements of each respective pillar of the three Basel regulatory frameworks (SRO_6). • To obtain a thorough understanding of how operational risk management is addressed by the regulatory frameworks and how it ought to be managed by banking institutions (SRO_7). • To identify and analyse each regulatory framework's strengths and weaknesses (SRO_8).
Synopsis of Chapter 3:
In Chapter 3, it was determined that the regulation of banks should not be over-complicated, and the regulatory capital should be carefully and accurately aligned with the banking operations and risk profiles of banking institutions. In 1988, the BCBS published the Basel I regulatory framework. The main objective of this regulatory framework was to ensure international convergence of supervisory

regulations governing the capital adequacy of international banks by providing clear guidelines to hold sufficient capital reserves to fund their daily operations. It was designed to be implemented within the BCBS member countries, all considered to have well-developed economies. The Basel I regulatory framework displayed both strengths and weaknesses. It succeeded in establishing a framework for capital regulation of internationally active banks and achieved important objectives. These included establishing a clear definition of regulatory capital, enabling the measurement of risk-weighted assets, and providing minimum metrics for regulatory capital to risk-weighted assets. The Basel I regulatory framework, however, did not provide guidelines for the management of market- and operational risk. The literature argued that it was not an optimal solution for banking institutions operating in developing- and emerging economies as these banks have unique challenges, risk profiles, and regulatory challenges. Thus, significant improvements to the Basel I regulatory framework were required.

In response to the criticisms and deficiencies of the Basel I regulatory framework, the BCBS decided in 1999 to develop a new and more comprehensive capital adequacy framework known as the Basel II regulatory framework. Initially, the improvements and objectives of the Basel II regulatory framework appeared to be effective, beneficial, and innovative. However, the challenges for banks became evident when the actual implementation process commenced.

The Basel II regulatory framework aimed to increase the safety and soundness of the global banking system without changing the overall level of capital in the system, which was criticised for being unrealistic and problematic. The regulatory framework recognised the responsibilities of host country supervisors. It increased the risk sensitivity of capital requirements without aggravating the procyclicality of lending. This proved a major concern as it failed to effectively control the rate and magnitude at which banks issued bonds to their clients.

Significant improvements were the modifications to manage credit risk more effectively and new risk management guidelines for market- and operational risk. Furthermore, banking institutions were guided to increase the transparency of their capital position and risk management practices. This transparency allowed

stakeholders to understand better the banks' association and relation to risk management. It empowered shareholders to enforce strict discipline in the banks' risk-taking and reserve capital-holding methods. However, many researchers and analysts have questioned the feasibility of implementing all its requirements, especially for banks operating in developing countries, owing to increased complexity and high compliance costs. In addition, the Basel II regulatory framework is very costly for banks due to the sophisticated and highly prescriptive approaches to specifying the risk weights for capital charges regarding credit-, market- and operational risk.

In December 2010, the BCBS approved the Basel III regulatory framework to strengthen banking institutions' capital- and liquidity regulations and enhance their risk management practices. Additionally, the Basel III regulatory framework intended to improve the international banking sector's ability to absorb economic shocks and financial disturbances, thereby significantly contributing to safeguarding and promoting the financial stability, resilience and sustainability of the global economy. The Basel III regulatory framework imposed stricter regulations on the minimum capital requirements for credit-, market-, and operational risk. It also included liquidity standards to mitigate and alleviate systemic liquidity risks. Furthermore, a leverage ratio requirement was developed to prevent the build-up of excessive leverage, and additions were made to the supervisory review- and market discipline pillars to further advance the active communication between banks and bank supervisors and improve the transparency of relevant information on a bank's risk profile and overall regulatory capital adequacy.

Researchers have, however, argued that complying with the enhanced requirements of the Basel III regulatory framework may adversely impact a bank's performance, as it could lead to a decrease in profitability and a tightening of lending margins. The framework also involves a significant degree of complexity, and the cost of complying with its requirements is extremely high. These cost implications pose significant problems for banks in developing economies, specifically for banks operating in African countries. There are also concerns regarding the correct implementation of all the requirements, as a limited number of banking experts have

the necessary expertise and experience to implement all the requirements correctly. These implementation challenges pose challenges for banking institutions in developing economies, specifically those operating in African countries, where access to specialised skills, experience and technology is often constrained.

Despite these significant challenges, the Basel III regulatory framework is a definite leap forward to creating a more resilient banking system and promoting the financial stability and resilience of individual banks and the global financial system. Several corrective measures need to be taken, but if these challenges are overcome and the necessary improvements are made, the Basel III regulatory framework can be of significant value for banking institutions operating in both developed and developing economies in the quest to create a more stable and resilient global banking system. The current study aimed to make a contribution in this regard.

Literature findings from Chapter 3:

- The Basel regulatory frameworks were developed to strengthen the soundness and stability of the international financial system by guiding banks to hold sufficient capital reserves to manage risk effectively and remove competition among international banks (LF_6).
- Significant improvements and expansions in scope and complexity were made as the Basel I regulatory framework evolved into the Basel II regulatory framework and then developed into the Basel III regulatory framework (LF_7).
- Banking institutions will experience significant value in implementing the requirements stipulated by the Basel regulatory frameworks as they assist banks in withstanding internal and external shocks and improving the global banking system's financial stability and resilience(LF_8).
- Bank supervisors and banks that operate in developing African economies find it challenging to implement the requirements of the Basel regulatory frameworks (due to its complexity, the high cost of compliance, and the shortage of competent human resources to implement the requirements effectively) and therefore require assistance (LF_9).

Source: Author (2022).

8.2.3 Chapter 4

Below in Table 8.3, the secondary research objectives, a synopsis and the key literature findings from Chapter 4 are presented.

Table 8.3: Secondary research objectives, synopsis, and key findings from Chapter 4

Secondary research objectives addressed in Chapter 4:
The following secondary research objectives were addressed in Chapter 4: • To obtain a comprehensive perspective and understanding of operational risk and its management in a banking context (SRO_9). • To examine the importance of risk culture and risk governance in banks (SRO_{10}). • To investigate the interdependence and interconnectedness of banks' risk culture- and risk governance practices to promote effective operational risk management in banking institutions (SRO_{11}).
Synopsis of Chapter 4:
In Chapter 4, a comprehensive discussion on the definition of operational risk was provided. From the literature review conducted on the various definitions of operational risk, it became clear that operational risk is complex and requires categorising the various operational risks into four main operational risk factors: processes, people, systems, and external events. Additionally, these four operational risk factors were classified into various operational risk events, which should all be carefully addressed and managed by banks to remain financially sound and sustainable. Operational risks in banking institutions are determined by a multitude of factors: the complexity of the bank's structure, the complexity of its operations, the range of the products and services offered, its geographical location, as well as the number of staff with appropriate experience and skills in managing operational risks. For these reasons, a one-size-fits-all approach to managing operational risk in banks is not optimal.

Operational risk management should be conducted proactively rather than attempting to measure the operational loss events after these losses have occurred. Identifying and assessing operational risks must be fundamental aspects of an effective operational risk management process in banks. The correct identification and assessment of operational risks enable banks to understand their risk profile better and thus allocate operational risk management resources and strategies more effectively. Hence, banks must utilise the various operational risk management tools to identify and assess operational risks effectively. These tools include: audit findings, internal data collection and analyses, external data collection and analysis, risk assessments, business process mapping, risk and performance indicators, scenario analysis, comparative analysis and stress testing.

Operational risk management is crucial to banking institutions' financial stability, resilience, and competitive nature. There is a growing awareness among banks of the positive impact effective operational risk management has on lowering profit and loss volatility, improving financial performance, freeing up capital and supporting banks' strategic objectives. Banks equipped with stronger operational risk management skills and capabilities are more likely to experience growth in uncertain, volatile business environments.

For banking institutions to obtain a competitive advantage and increase their overall financial performance, they must seek improved methods to manage operational risks. Furthermore, banks must understand and acknowledge the critical relationship between operational risk management, risk culture, and risk governance to enable and promote successful operational risk management practices.

A risk culture involves crucial elements in a bank, including risk competence, organisation, relationships, and motivation. These are all important to make banks more effective in managing operational risk and, as a result, more cohesive and resilient to internal and external disruptions. A robust risk culture builds business resilience and minimises potential losses. A risk culture that encourages and sustains regular interaction among all relevant parties is fundamental to the successful operation of a bank's operational risk management regime. Banks' risk

culture should not be an isolated component but should be integrated, influenced by, and carefully aligned with risk governance.

The board of directors and senior management of banks must demonstrate and exercise commitment to their risk governance responsibilities, as this commitment will immediately impact the quality and manner in which operational risk management is exercised.

Ethical board practices and sound risk governance are essential to effectively and efficiently manage operational risk. This entails that the important principles of accountability, participation and transparency are incorporated into well-established policies and structures within banks to facilitate, implement and promote risk-related decision-making.

The 3LOD risk operating model should be incorporated to enable effective governance and management of operational risk as it enables top-down monitoring and management of operational risk. Furthermore, banks should pay attention to accurately disclosing operational risk management information. This will ensure that stakeholders are provided with accurate information about the bank's ability to successfully identify, assess, monitor, and control its operational risks, which promotes market discipline.

Finally, the vital role of bank supervisory authorities should be highlighted. Their availability and willingness to guide and support banks to establish, improve and promote successful operational risk management practices are essential.

Literature findings from Chapter 4:

The literature findings in this chapter will be presented in three sub-sections, namely: (1) Literature findings relating to operational risk management, (2) Literature findings relating to risk culture, and (3) Literature findings relating to risk governance.

(1) Literature findings relating to operational risk management

- Operational risk is a critical element in a bank's risk management regime (LF_{10}).
- Operational risk management tools are essential to identify and assess operational risks effectively in banking institutions (LF_{11}).
- The monitoring and reporting of operational risk management information should occur regularly (LF_{12}).

- Appropriate reporting procedures should be in place at board-, senior management- and business-line levels that support the proactive management of operational risks (LF_{13}).
- Effective operational risk management capabilities could assist banks in obtaining a competitive advantage (LF_{14}).
- Successful operational risk management maximises shareholder value and improves the financial stability and resilience of banks and banking systems (LF_{15}).
- A bank's risk culture and risk governance practices play a critical role in successful operational risk management (LF_{16}).

(2) Literature findings relating to risk culture

The risk culture of banks should have the following essential characteristics**:**

- It must have a distinct and consistent tone from the board of directors and senior management regarding risk-taking and risk-avoidance (LF_{17}).
- There must be clear leadership from the board of directors and senior management to establish corporate values that promote integrity among all bank employees (LF_{18}).
- All bank employees must be committed to the ethical principles of the bank (LF_{19}).
- All stakeholder positions must be considered in decision-making (LF_{20}).
- Timely, accurate and transparent information must flow up and down the bank hierarchy to all relevant parties (LF_{21}).
- There must be a general understanding that no process or activity is too large, complex, or obscure for the related operational risks not to be swiftly understood, effectively communicated, and appropriately managed (LF_{22}).
- There must be regular reporting and monitoring of operational risk management activities (LF_{23}).
- Regular training opportunities must be available to all bank employees to enhance their perception and understanding of an effective risk culture that supports successful operational risk management (LF_{24}).

- There must be an appropriate incentive system to encourage positive, constructive behaviour and whistleblowing among all bank employees (LF_{25}).
- There must be a risk culture that does not only focus on avoiding risk but also on risk-seeking actions to create value (LF_{26}).
- A risk culture must be implemented and operated in conjunction with the risk governance practices of banking institutions (LF_{27}).

(3) Literature findings relating to risk governance

- For the operational risk governance to be successful, the bank must have a dedicated board of directors and CRO who forms part of the bank's board of directors (LF_{28}).
- The board of directors should ensure that the bank's operational risk management strategy is aligned with its mission, vision, values and objectives (LF_{29}).
- The bank's senior management team is tasked with providing the required infrastructure to enable effective operational risk management processes (LF_{30}).
- A risk management operating model incorporating the 3LOD is required, as it will engage and interact with the board of directors, senior management and external authorities to ensure effective operational risk management practices (LF_{31}).
- Best practice requires that the CRO of the bank report to the CEO and board of directors (LF_{32}).
- The CRO should be independent, have specific duties and responsibilities distinct from other executive functions, and meet regularly with the board of directors (LF_{33}).
- The risk management department should be centralised within the bank to guide the implementation of operational risk policies and monitor their proper execution and compliance with all the necessary operational risk processes (LF_{34}).
- Compliance concerns every bank employee and should be considered an essential component of the bank's operational risk management practices (LF_{35}).

- For the compliance function to operate effectively, it must have sufficient authority, stature, independence, resources, and access to the board of directors (LF_{36}).
- The compliance function should report directly to the board of directors on all important operational risk management matters (LF_{37}).
- Internal audit is responsible for establishing a systematic, disciplined approach to evaluate and improve the effectiveness of operational risk management, control- and governance processes (LF_{38}).
- The internal audit function must operate with the highest level of independence and objectivity, which includes unrestricted access to senior management and the bank's board of directors (LF_{39}).
- External audit is regarded as the outside check on internal governance functions and provides independent observations on the effective functioning of the 3LOD risk operating model (LF_{40}).
- The accurate disclosure and transparency of operational risk management information to bank stakeholders are important and promote market discipline (LF_{41}).
- Disclosure activities should include information on a bank's ability to successfully identify, assess, monitor, and control its operational risks (LF_{42}).
- It is crucial that central banks and/or supervisory authorities undertake the essential leadership role of adequately supervising banks (LF_{43}).
- Typical supervisory activities regarding operational risk management will include regularly interacting and communicating with banks regarding the establishment, improvement and promotion of effective and efficient operational risk management practices by (LF_{44}):
  - ✓ Prescribing and guiding the operational risk governance structures of banks.
  - ✓ Providing assistance in designing and shaping the internal control environment of banks.
  - ✓ Regularly issuing guidelines to banks to assist with the improvement of operational risk management.

Source: Author (2022).

8.2.4 Linking of literature findings to the study's primary research problem

Considering the primary research problem presented in Section 1.3, it was determined that: (1) Ghana is still recovering from its 2018 financial crisis, (2) the Ghanaian banking sector is characterised as inefficient and less experienced, and (3) the Bank of Ghana is focused on implementing regulatory and supervisory guidelines aligned with the Basel regulatory frameworks, specifically those guidelines regarding operational risk management.

From literature study, the following main conclusions were drawn:

- Bank regulation and risk management are critical to support and enhance the successful operation of banks.
- The Basel regulatory frameworks are of significant value for banks, particularly concerning operational risk management, as it is critical in promoting financial stability in banks.
- Risk culture- and risk governance practices of banks must be aligned and implemented in such a manner as to support and enhance effective operational risk management.

Accordingly, the need to conduct empirical research to assist Ghanaian banks in enhancing their compliance with the Basel III regulatory framework's operational risk management requirements was validated.

8.3 Empirical findings

The study's empirical findings were presented in two separate chapters: Chapters 6 and 7. The secondary research objectives, a synopsis and the key empirical findings for Chapters 6 and 7 are presented in the section below.

8.3.1 Chapter 6

In Table 8.4, the secondary research objectives, a synopsis and the key empirical findings from Chapter 6 are presented.

Table 8.4: Secondary research objectives, synopsis and key findings from Chapter 6

Secondary research objectives addressed in Chapter 6:
The following research objectives were addressed in Chapter 6: • To obtain general information on the respondents and Ghanaian banks (SRO_{12}). • To investigate the operational risk management practices of Ghanaian banks (SRO_{13}). • To explore the risk governance practices of Ghanaian banks (SRO_{14}). • To assess the implementation of a risk culture in Ghanaian banks (SRO_{15}).
Synopsis of Chapter 6:
In Chapter 6, the descriptive statistical analyses on the primary data were performed to obtain general information and explore the operational risk management practices, risk governance practices and the implementation of a risk culture within the surveyed Ghanaian banks.
Empirical findings from Chapter 6:
(a) Empirical findings on Ghanaian banks • The business lines offered by Ghanaian banks include (in order of dominancy) (EF_1): ✓ Retail banking (97%). ✓ Commercial banking (97%). ✓ Payment and settlement services (86%). ✓ Trading and sales (83%). ✓ Corporate finance (83%). ✓ Agency services (40%). ✓ Asset management (35%). ✓ Retail brokerage (21%). • The respondents employed at Ghanaian banks had an average of 11 years of experience, with 2 years being the minimum and 28 years being the maximum (EF_2).

- The respondents were employed in the following areas in their respective banks (EF_3) (in order of dominancy):
  - ✓ Risk management (80.7%).
  - ✓ Corporate governance and compliance (10.5%).
  - ✓ Treasury (3.5%).
  - ✓ Finance, Investment and Accounting (3.5%).
  - ✓ Credit (1.8%),

(b) Empirical findings on the operational risk management practices of Ghanaian banks

- The implementation status of the operational risk management requirements of the Basel III regulatory framework (EF_4):
  - ✓ Five per cent (5%) of the respondents indicated that the requirements are fully implemented at their bank.
  - ✓ Fifty-eight per cent (58%) of the respondents indicated that the requirements are still in the process of being implemented at their bank.
  - ✓ Thirty-three per cent (33%) of the respondents indicated the implementation process had not yet started at their bank.
  - ✓ Four per cent (4%) of the respondents indicated that they did not know the implementation status at their bank.
- The operational risk management tools utilised by Ghanaian banks include the following (EF_5) (in order of frequency/regularity):
  - ✓ Risk assessments (91%).
  - ✓ Internal loss data collection and analysis (88%).
  - ✓ Audit findings (86%).
  - ✓ Risk and performance indicators (83%).
  - ✓ Business process mapping (72%).
  - ✓ Stress testing (67%).
  - ✓ External data collection (56%).
  - ✓ Scenario analysis (49%).
  - ✓ Comparative analysis (47%).

- Monitoring of operational risks (EF_6):
  - ✓ Sixty-five per cent (65%) of respondents indicated that operational risks are monitored to a very large extent at their bank. Thirty-three per cent (33%) of the respondents indicated that operational risks are monitored to a large extent at their bank. Two per cent (2%) of the respondents indicated that operational risk is monitored to a limited extent at their bank.
- Reporting of operational risks (EF_7):
  - ✓ Reporting mechanisms at board level: Sixty-eight per cent (68%) of the respondents indicated that reporting mechanisms are in place to a very large extent. Thirty per cent (30%) indicated that these reporting mechanisms are in place to a large extent, with 2% indicating that operational risk reporting mechanisms are in place to a limited extent.
  - ✓ Reporting mechanisms at senior management level: Forty-nine per cent (49%) of the respondents indicated that reporting mechanisms at senior management level are in place to a very large extent. Forty-seven per cent (47%) stated that these reporting mechanisms are in place to a large extent, with 4% indicating that operational risk reporting mechanisms are in place to a limited extent.
  - ✓ Reporting mechanisms at business-line level: Thirty-nine per cent (39%) of respondents believed that at the business-line level, reporting mechanisms are in place to a very large extent. A further 54% indicated that these reporting mechanisms are in place to a large extent, and 7% indicated that operational risk reporting mechanisms are in place to a limited extent.
- Disclosure of operational risks (EF_8):
  - ✓ Twenty-five per cent (25%) of the respondents agreed to a very large extent that the public disclosure of operational risk management information enables stakeholders to assess a bank's willingness to disclose their operational risk management information.
  - ✓ Twenty-five per cent (25%) agreed to a large extent that the public disclosure of operational risk management information enables stakeholders to assess

a bank's willingness to disclose their operational risk management information.

- ✓ Forty-one per cent (41%) agreed to a limited extent that the public disclosure of operational risk management information enables stakeholders to assess a bank's willingness to disclose their operational risk management information.
- ✓ Nine per cent (9%) agreed to no extent that the public disclosure of operational risk management information enables stakeholders to assess a bank's willingness to disclose their operational risk management information.

- The benefit of operational risk management (EF_9):
  - ✓ Freeing up capital: Forty-two per cent (42%) of the respondents strongly agreed, 53% agreed, 3% disagreed, and only 2% strongly disagreed that the effective management of operational risk assists Ghanaian banks in freeing up capital, which can be utilised in other business units of the bank.
  - ✓ Lowers profit and loss volatility: Thirty-three per cent (33%) of the respondents strongly agreed, 45% agreed, 15% disagreed, and 7% strongly disagreed that effective operational risk management lowers the profit and loss volatility of Ghanaian banks.
  - ✓ Competitive advantage: Thirty-three per cent (33%) of the respondents strongly agreed, 63% agreed, and 4% disagreed that the effective management of operational risk can be regarded as a competitive advantage for Ghanaian banks.

(c) Empirical findings on the risk governance practices of Ghanaian banks

- The operational risk department (EF_{10}):
  - ✓ The majority (96%) of respondents indicated that an operational risk management department exists at their respective banks, with a small percentage (4%) specifying that their banks did not have an operational risk department.
  - ✓ Forty per cent (40%) of the respondents indicated that the operational risk department reports to the CRO, whereas 22% specified that the operational

risk department reports to the board of directors. Twenty-one per cent (21%) indicated that the operational risk department reports to the board risk management committee, and 17% indicated that the operational risk department reports to senior management.

- The chief risk officer (CRO) (EF_{11}):
  - ✓ Seventy-two per cent (72%) of the respondents indicated that the CRO is not a member of the board of directors, whereas 27% indicated that the CRO is a member of the board of directors. Only 1% of the respondents reported no formally appointed CRO at their bank.
  - ✓ Seventy-one point four per cent (71.4%) of the respondents indicated that the CRO reported directly to the CEO, whereas 17.9% specified that the CRO reported directly to the board of directors. A final 10.7% indicated that the CRO reported directly to the chairperson of the risk committee.
- 3LOD risk operating model (EF_{12}):
  - ✓ Seventy point two per cent (70.2%) of the respondents strongly agreed, 26.3% agreed, and 3.5% disagreed that their respective banks utilise the 3LOD risk operating model regarding operational risk management.
  - ✓ Fifty-nine point six per cent (59.6%) of the respondents strongly agreed, 28.1% agreed, and 12.3% disagreed that the exact roles and responsibilities of each line of defence are communicated at their respective banks regarding the management of operational risk.
- Compliance (EF_{13}):
  - ✓ Seventy-five point four per cent (75.4%) of the respondents strongly agreed, 19.3% agreed, and 5.3% disagreed that an independent compliance function exists at their respective banks.
  - ✓ Fifty per cent (50.0%) of the respondents strongly agreed, 14.3% agreed, 32.1% disagreed, and only 3.6% strongly disagreed that the compliance function reports directly to the board of directors at their respective banks.
  - ✓ Seventy-one point nine per cent (71.9%) of the respondents strongly agreed, 21.1% agreed, and 7.0% disagreed that the compliance function at their respective banks advises the board of directors and senior management on

complying with applicable laws and standards regarding the management of operational risk.

- Internal audit (EF_{14}):
  - ✓ Fifty-four point four per cent (54.4%) of the respondents strongly agreed, 43.9% agreed, and 1.8% disagreed that internal audit performed periodic assessments on their respective bank's risk governance framework regarding operational risk management.
  - ✓ Fifty point nine per cent (50.9%) of the respondents strongly agreed, 47.4% agreed, and 1.8% disagreed that internal audit independently assesses the effectiveness and efficiency of their respective banks' operational risk management practices.
- Disclosure and transparency (EF_{15}):
  - ✓ Forty-two point six per cent (42.6%) of the respondents strongly agreed, 50.0% agreed, and 7.4% disagreed that their respective banks disclose key points concerning their risk exposures and risk management strategies regarding the management of operational risk.
  - ✓ Thirty-three point nine per cent (33.9%) of the respondents strongly agreed, 50.0% agreed, 14.3% disagreed, and only 1.8% strongly disagreed that their respective banks disclose information in such a manner that all the relevant stakeholders can access and comprehend the operational risk information without difficulty.
- The bank supervisor (EF_{16}):
  - ✓ Thirty-one point six per cent (31.6%) of the respondents strongly agreed, 59.6% agreed, and 8.8% disagreed that their respective banks receive regular guidance from the bank supervisor regarding the management of operational risk.
  - ✓ The findings on the type of guidance provided to Ghanaian banks are summarised as follows:

Table 8.5: Type of guidance provided by the bank supervisor

Guidance type:	Strongly agree (%)	Agree (%)	Disagree (%)	Strongly agree (%)
Communication	70	21	9	0
Interviews	21	42	28	9
On- and off-site monitoring	39	52	7	2
Self-assessments	20	42	25	13
Training	16	30	44	10

Source: Author (2022).

(d) Empirical findings on the implementation of a risk culture in Ghanaian banks

- Existence of a risk culture (EF_{17}):
  - ✓ Forty-six point three per cent (46.3%) of the respondents indicated that a risk culture that supports the effective management of operational risk is fully implemented in their banks.
  - ✓ Fifty-three point seven per cent (53.7%) of the respondents indicated that a risk culture that supports the effective management of operational risk is partially implemented in their banks.
- Responsibility for the existence of a risk culture (EF_{18}): The responsibility for the existence of a risk culture is regarded as a communal responsibility shared by (in order of regularity):
  - ✓ The CRO (79%).
  - ✓ The senior management (75%).
  - ✓ All staff members (65%).
  - ✓ The operational risk committee (61%).
  - ✓ Line management (60%).
  - ✓ The board of directors (54%).

- The communication of operational risk management information (EF_{19}): The manner in which operational risk management information is communicated (in order of regularity):
  - ✓ Across the different business lines (66.7%).
  - ✓ Upwards to senior management from the different business lines (66.7%).
  - ✓ Downwards from senior management to the business lines (57.9%).
  - ✓ Upwards to the board of directors from senior management (52.6%).
  - ✓ Downwards from the board of directors to senior management (36.8%).
- Challenges with the implementation of a risk culture (EF_{20}): The most severe implementation challenges (in order of severity):
  - ✓ Training and development (86%).
  - ✓ Effective communication (60%).
  - ✓ Understanding of roles and responsibilities (37%).
  - ✓ Disclosure and transparency (37%).
  - ✓ Performance appraisal (29%).
  - ✓ Technological and environmental barriers (23%).

Source: Author (2022).

8.3.2 Chapter 7

Table 8.6 presents the secondary research objectives, a synopsis and key empirical findings from Chapter 7.

Table 8.6: Secondary research objectives, synopsis and key findings from Chapter 7

Secondary research objectives addressed in Chapter 7:
The following research objectives were addressed in Chapter 7: • To investigate the operational risk management practices of Ghanaian banks (SRO_{13}). • To explore the risk governance practices of Ghanaian banks (SRO_{14}). • To assess the implementation of a risk culture in Ghanaian banks (SRO_{15}).
Synopsis of Chapter 7:

In Chapter 7, the inferential statistical analyses (by means of the Mann-Whitney U test, Fischer's exact test and multiple regression analyses) were conducted on the primary data collected from the surveyed Ghanaian banks to explore the operational risk management practices, risk governance practices and the implementation of a risk culture within these banks.

Empirical findings from Chapter 7:

(a) Empirical findings on the operational risk management practices of Ghanaian banks

- Operational risk management tools utilised:
  - ✓ The surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III tend to utilise more operational risk management tools to identify and assess operational risk than those banks that have not started to implement the operational risk management requirements of Basel III (EF_{21}).
  - ✓ The surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III are significantly more likely to utilise audit findings to identify and assess operational risk than the banks that have not started to implement the operational risk management requirements of Basel III (EF_{22}).
  - ✓ No statistically significant association was found in the surveyed Ghanaian banks between the level of implementation of the operational risk management requirements of Basel III and the utilisation of internal loss data collection and analysis to identify and assess operational risk (EF_{23}).
  - ✓ The surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III are significantly more likely to utilise external data collection and analysis to identify and assess operational risk than the banks that have not started to implement the operational risk management requirements of Basel III (EF_{24}).
  - ✓ The surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III are significantly more likely to utilise risk assessments to identify and assess operational risk than

the banks that have not started implementing the operational risk management requirements of Basel III (EF_{25}).

- ✓ No statistically significant association was found between the level of implementation of the operational risk management requirements of Basel III and the utilisation of business process mapping to identify and assess operational risk among the surveyed Ghanaian banks (EF_{26}).
- ✓ The surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III are significantly more likely to utilise risk performance indicators to identify and assess operational risk than the banks that have not started implementing the operational risk management requirements of Basel III (EF_{27}).
- ✓ No statistically significant association was found in the surveyed Ghanaian banks between the level of implementation of the operational risk management requirements of Basel III and the utilisation of scenario analysis to identify and assess operational risk (EF_{28}).
- ✓ No statistically significant association was found in the surveyed Ghanaian banks between the level of implementation of the operational risk management requirements of Basel III and the utilisation of comparative analysis to identify and assess operational risk (EF_{29}).
- ✓ No statistically significant association was found between surveyed Ghanaian banks regarding the level of implementation of the operational risk management requirements of Basel III and the utilisation of stress testing to identify and assess operational risk (EF_{30}).

- The benefit of operational risk management:
  - ✓ The surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III tend to agree more strongly on the benefit of operational risk management compared to those banks that have not started the implementation process (EF_{31}).
  - ✓ If the surveyed Ghanaian banks utilise more of the available operational risk management tools to identify and assess operational risk, a higher perceived benefit of operational risk management will be achieved/experienced (EF_{32}).

- ✓ If the surveyed Ghanaian banks increase their level of implementation of a risk culture that encourages and supports operational risk management, a higher perceived value of operational risk management will be achieved/experienced (EF_{33}).

- The monitoring of operational risk:
  - ✓ No statistically significant difference was found between the surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III and those that have not started with implementation regarding the extent to which the banks have monitoring and reporting procedures in place (EF_{34}).

(b) Empirical findings on the risk governance practices of Ghanaian banks

- 3LOD risk operating model:
  - ✓ No statistically significant difference was found between the surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III and those that have not started with implementation concerning the extent to which these banks utilise the 3LOD risk operating model for the management of operational risk (EF_{35}).
- Compliance:
  - ✓ No statistically significant difference was found between the surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III and those that have not started with implementation regarding the extent to which these banks agree that the compliance function advises the board and senior management on complying with laws and standards about operational risk (EF_{36}).
- Internal audit:
  - ✓ No statistically significant difference was found between the surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III and those that have not started with implementation regarding the extent to which these banks agree that the

internal audit function independently assesses the effectiveness and efficiency of operational risk management (EF_{37}).

- Disclosure and transparency:
  - ✓ No statistically significant difference was found between the surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III and those that have not started with implementation regarding the extent to which these banks disclose key points concerning their risk exposures and risk management strategies on the management of operational risk (EF_{38}).
- The bank supervisor:
  - ✓ No statistically significant difference was found between the surveyed Ghanaian banks that are in the process of implementing the operational risk management requirements of Basel III and those that have not started with implementation regarding the extent to which they receive regular guidance from the bank supervisor on the governance and management of operational risk (EF_{39}).

(c) Empirical findings on the implementation of a risk culture in Ghanaian banks

- Implementation of a risk culture:
  - ✓ No statistically significant difference was found between the surveyed Ghanaian banks that have fully implemented- and a partially implemented risk culture that encourages and supports operational risk management concerning the number of operational risk management tools utilised to identify and assess operational risk (EF_{40}).
  - ✓ No statistically significant difference was found between the surveyed Ghanaian banks that have fully implemented- and partially implemented risk culture that encourages and supports operational risk management and the banks' level of agreement on the benefit of operational risk management (EF_{41}).

- ✓ No statistically significant difference was found between the surveyed Ghanaian banks that have a fully implemented- and a partially implemented risk culture that encourages and supports operational risk management and of extent to which these banks have monitoring and reporting procedures in place concerning operational risk management EF_{42}).
- ✓ The surveyed Ghanaian banks that have fully implemented a risk culture that encourages and supports operational risk management tend to agree more strongly on utilising the 3LOD risk operating model for the management of operational risk in comparison to those that have a partially implemented risk culture (EF_{43}).
- ✓ No statistically significant difference was found between the surveyed Ghanaian banks that have a fully implemented- and a partially implemented risk culture that encourages and supports operational risk management and the extent to which they agree that the compliance function advises the board and senior management on complying with laws and standards about operational risk (EF_{44}).
- ✓ The surveyed Ghanaian banks that have fully implemented a risk culture that encourages and supports operational risk management tend to agree more strongly that the internal audit function independently assesses the effectiveness and efficiency of operational risk management than those with a partially implemented risk culture (EF_{45}).
- ✓ The surveyed Ghanaian banks that have fully implemented a risk culture that encourages and supports operational risk management tend to agree more strongly that they disclose key points concerning their risk exposures and risk management strategies regarding operational risk management in comparison to those that only have a partially implemented risk culture (EF_{46}).
- ✓ The surveyed Ghanaian banks that have fully implemented a risk culture that encourages and supports operational risk management tend to agree more strongly that they receive regular guidance from the bank supervisor

regarding the governance and management of operational risk in comparison to those that only have a partially implemented risk culture (EF_{47}).

- ✓ No statistically significant association was found in the surveyed Ghanaian banks between the level of implementation of the operational risk management requirements of Basel III and the level of implementation of a risk culture that encourages and supports operational risk management (EF_{48}).
- ✓ If the surveyed Ghanaian banks increase their level of implementation of a risk culture that encourages and supports operational risk management, the disclosure and transparency of operational risk management information will be improved (EF_{49}).

Source: Author (2022).

8.4 Guidelines

The contribution of this study lies in the guidelines presented in Sections 8.4.1 – 8.4.3. These will address the operational risk management-, risk governance- and risk culture practices of Ghanaian banks with the ultimate purpose of enhancing the level of compliance with the operational risk management requirements of the Basel III regulatory framework.

8.4.1 Operational risk management practices

8.4.1.1 Basel III implementation - based on LF_5, LF_6, LF_8, LF_{10}, EF_4

It was found that only 5% of the surveyed Ghanaian banks have managed to successfully implement the operational risk management requirements of the Basel III regulatory framework. Ghanaian banks will therefore find guidelines to assist in implementing Basel III of value as it will enhance their practices regarding operational risk, risk culture and risk governance − which will all contribute towards improving the financial stability and resilience of Ghanaian banks.

8.4.1.2 Operational risk management tools – based on LF_{11}, EF_{5}, EF_{21-30}

Ghanaian banks should carefully consider the optimal utilisation of operational risk management tools to identify and assess operational risk. The optimal utilisation of these tools will enhance operational risk management and increase the benefits Ghanaian banks experience because of improved operational risk management practices. Although it was found that Ghanaian banks use operational risk management tools in their operational risk management practices, not all of these tools are optimally utilised. Ghanaian banks should therefore improve the utilisation of the following operational risk management tools by incorporating the following measures.

8.4.1.2.1 Internal losses: Data collection and analysis

Internal data collection and analysis should be a continuous process and should be exercised on all operational risks. The board of directors is tasked with the responsibility to guide the senior management team of a bank and should take the initiative and responsibility to understand all the major operational risks. Senior management of a bank should monitor the internal controls carefully and promote the importance of integrity and high ethical standards regarding internal control to all bank personnel. The internal data collection and analysis activities should be clearly defined at every business unit of the bank, and a clear segregation of duties must exist among bank personnel. This will prevent unnecessary bottlenecks and conflicting responsibilities among bank personnel. Effective communication remains critical in internal data collection and analysis as it will ensure that accurate information is available to relevant bank personnel on demand.

8.4.1.2.2 Business process mapping

This operational risk management tool will enable Ghanaian banks to identify critical operational risks in the bank's overall business processes, thus allowing the accurate identification and understanding of the risks and interdependency with other risks to promote accurate decision-making.

8.4.1.2.3 Scenario analysis

Successful scenario analysis depends on a team of bank personnel with appropriate skills and experience regarding operational risk management. Ghanaian banks should prioritise the availability and attendance of training interventions for bank personnel and senior management on scenario building and analysis in order to improve their operational risk management skills and knowledge. It is also essential that the operational risk management team collaborate with senior management when conducting scenario analysis.

8.4.1.2.4 Stress testing

Ghanaian banks should make it a key objective to utilise the scenarios developed in scenario analysis when conducting stress testing. With this approach, banks will be alerted proactively to certain extreme conditions and will be able to absorb losses while successfully managing operational risks. Banks should ensure that stress testing is conducted and reviewed regularly to ensure both the accuracy and relevancy of the stress testing results. Finally, they should also incorporate new information regarding emerging operational risk in their stress testing procedures.

8.4.1.2.5 Comparative analysis

Comparative analysis will prove valuable to Ghanaian banks as utilising this operational risk management tool will allow them to compare the results obtained from other operational risk management tools. This will enable a comprehensive perspective of the bank's operational risk profile and facilitate assessing the effectiveness of the other operational risk management tools, which could lead to further improvements in the management of operational risk.

8.4.1.3 Monitoring and reporting of operational risks – based on LF_{12}, LF_{13}, EF_6, EF_7, EF_{34}

To promote the proactive management of operational risk, Ghanaian banks must pay attention to the following monitoring and reporting activities:

- Monitoring and reporting activities should be in place at board level, senior management level as well as within all the business lines of the bank.
- Senior management has the responsibility to ensure that monitoring and reporting activities occur regularly.
- The operational risk reports should ideally describe the operational risk profile of the bank by providing internal financial, operational, and compliance indicators as well as external market and environmental information about events and conditions that affect decision-making.

In Section 8.4.2, the risk culture practices are discussed.

8.4.2 Risk culture practices

The risk culture of Ghanaian banks should focus attention on each of the four risk culture drivers: 1) risk competence, 2) organisation, 3) relationships, and 4) motivation. The four risk culture drivers will enable Ghanaian banks to emphasise the importance of having effective operational risk management practices by establishing the appropriate beliefs, attitudes and behaviour among their personnel. This will promote operational risk management and enable banks to experience the benefits of successful operational risk management. Additionally, these four risk culture drivers will support the risk governance practices of the banks. The guidelines on each of the four risk culture drivers are presented below and are based on $L_{17\text{-}27}$, $EF_{17\text{-}20,}$ EF_{33} and $EF_{40\text{-}49}$.

8.4.2.1 Risk competence

Ghanaian banks will need to recruit, retain and develop experienced and knowledgeable bank employees with the necessary knowledge, skills, attitudes, values and attributes to manage operational risks successfully. Therefore, they must prioritise offering regular training opportunities to all staff members at different hierarchical levels on how to manage operational risk in accordance with the Basel III regulations and deal with operational risk in a dynamic manner. The training interventions should focus on the following key areas that Ghanaian banks find challenging.

- Creating awareness among bank employees of the importance of operational risk management to ensure the resilience and sustainability of Ghanaian banks.
- Fostering a stimulating environment where knowledge and competencies of operational risk management are cultivated, valued and developed.
- Eliminating the perception among staff members that operational risk management should only occur re-actively. Emphasis should be on a proactive approach which is more beneficial to the strategy setting and the resilience of banks.
- Explaining the value of successful operational risk management practices by creating a competitive advantage and contributing towards the financial well-being, stability and resilience of Ghanaian banks.
- Clarifying the operational risk management requirements of the Basel III regulatory framework.

8.4.2.2 Organisation

Ghanaian banks should ensure that the correct procedures, processes and governance systems are established to provide the ideal infrastructure for successful operational risk management. Therefore, the board of directors must ensure that the correct tone exists at the top of the organisation where operational risk management is prioritised, acknowledged and rewarded. This embedded operational risk management culture should flow throughout the bank, which is why the senior management team should ensure that every bank employee understands, supports and exercises such a risk culture. Because operational risks are dynamic and evolving, the risk culture of Ghanaian banks should be periodically reviewed and adjusted to accommodate new trends, attitudes and perceptions of operational risk and its management. Finally, Ghanaian banks should ensure that the organisation, as a risk culture driver, is closely aligned with their risk governance practices. This will be elaborated upon in Section 8.4.3, where the risk governance practices of Ghanaian banks are discussed.

8.4.2.3 Relationships

It is critical that Ghanaian banks recognise and appreciate that the communication of operational risk information between staff members should be a continuous, interactive

process of providing, sharing and obtaining the required information. Pertinent, structured communication channels should be established throughout these banks to ensure that operational risks are timeously identified, correctly understood, and managed appropriately. The board of directors and senior management of Ghanaian banks have a vital role in establishing and maintaining these communication channels so that operational risk information flows vertically and horizontally throughout the bank. The board of directors must provide strong leadership at the top of the organisation. The senior management personnel are responsible for providing the necessary support to all bank employees so that operational risk management information is effectively communicated, correctly interpreted, and successfully managed.

The Ghanaian banks should therefore aim to improve all of the following communication channels within their banks:

- Upwards communication to senior management from the different business lines.
- Upwards communication to the board of directors from senior management.
- Downwards communication from the board of directors to senior management.
- Downwards communication from senior management to the different business lines.
- Communication across the different business lines.

8.4.2.4 Motivation

Motivation derives from the manner in which bank employees manage operational risks. The board of directors is tasked with formulating the bank's operational risk appetite, which the senior management team should then communicate to staff members working in the different business lines of the bank.

For Ghanaian banks to foster effective operational risk management practices, it is recommended that an incentive system and a whistleblowing policy should be instituted to promote prudent risk-taking and accurate decision-making. Effective operational risk management practices exercised by bank employees should thus be appropriately acknowledged and rewarded. An incentive system and whistleblowing policy will encourage bank employees and could also be utilised to identify shortcomings in an

employee's operational risk management competencies, capabilities and behaviour. These deficiencies could be addressed by offering bank employees appropriate training interventions and individual mentoring programs. This will likely remove unethical careless behaviour, enhance the quality of operational risk management practices across the entire bank, and improve the risk competence component as a risk culture driver. The improvements to the Ghanaian banks' incentive system and whistleblowing policy should include the items mentioned below.

8.4.2.4.1 Incentive system

It is recommended that the Ghanaian banks modify and improve their incentive systems by including operational risk management as a key performance measurement and pay particular attention to the following points in the design of such a system:

- There should be congruence between the bank's operational risk management objectives and the personal objectives of its employees.
- Bank employees must be motivated to exercise operational risk management practices effectively and efficiently.
- Highly motivated, knowledgeable and experienced employees in the field of operational risk management should be appointed and retained.

8.4.2.4.2 Whistleblowing policy

It is recommended that Ghanaian banks include operational risk management malpractice in their whistleblowing policies. Such a policy will be beneficial to Ghanaian banks for the following reasons:

- It encourages a risk culture where misconduct and malpractice can be addressed swiftly before regulatory action is required.
- It offers banks the opportunity to reinforce the expected operational risk management standards.
- It communicates to staff members that the bank takes any wrongdoing seriously, is committed to identifying poor and unlawful behaviours, and will undertake appropriate corrective measures.

- It provides additional support to banks to identify poor and careless operational risk behaviour, which can be appropriately addressed.

8.4.3 Risk governance practices

In order to improve the governance of operational risk, it is recommended that Ghanaian banks pay additional attention to the following elements in their governance practices: (1) the 3LOD risk operating model, (2) the CRO, (3) the operational risk management department, (4) the compliance function, (5) the internal audit function, (6) the disclosure and transparency of operational risk management information, and (7) involving the bank supervisor. These seven elements will be discussed in further detail below.

8.4.3.1 The three lines of defence risk operating model – based on LF_{31}, EF_{12}, EF_{35}, EF_{43}

It is recommended that Ghanaian banks implement a risk management operating model which incorporates the 3LOD. This will enable the active interaction among the board of directors, senior management, the front office, business units, the operational risk management department, the compliance function, the internal audit function, the external audit function, and supervisory authorities to ensure that operational risks are governed and managed effectively and efficiently.

To further assist with the successful implementation and operation of the 3LOD risk operating model, the following measures are essential:

- The risk culture should fully support and encourage using the 3LOD risk operation model.
- The size, complexity and risk profile of the bank's operations will determine the degree of formality in which the 3LOD operating model is implemented in the governance and management of operational risk. The board of directors is responsible for exercising its discretion in this regard.
- Clear and effective communication channels should be established between the 3LOD, the board of directors, senior management personnel and external bodies.

- A definite separation of duties should be established between each line of defence, with no breaches in coverage.

8.4.3.2 The chief risk officer– based on LF_{28}, LF_{32-33}, EF_{11}

The positioning of the CRO within Ghanaian banks is crucial, as it will impact the effectiveness of the operational risk management department. The CRO should be independent and have specific responsibilities distinct from other executive functions. The CRO should have access to any operational risk management information required to perform their responsibilities effectively. It is recommended that the CRO should have unhindered access and a direct reporting line to the board of directors and the CEO of the bank. Furthermore, the CRO and board of directors must interact and communicate regularly, ensuring that the bank's operational risk management strategy remains relevant and effective.

8.4.3.3 Operational risk management department – based on LF_{34}, EF_{10}

Ghanaian banks' operational risk management departments should be positioned to obtain a holistic perspective of their operational risk profiles. Therefore, the operational risk management department should form part of the second line of defence and be tasked with providing a bank's different business lines with the necessary support to perform its operational risk management activities effectively. The operational risk management department, chaired by the head of operational risk, should furthermore report to the CRO and be tasked with the leadership responsibility to ensure that the operational risk management department continues to operate effectively and successfully.

8.4.3.4 Compliance - based on LF_{35-37}, EF_{13}, EF_{36}, EF_{44}

Ghanaian banks should pay appropriate attention to the compliance function, which is essential in improving operational risk management practices. Compliance concerns every bank employee; therefore, the risk culture of Ghanaian banks should be designed so that the importance of operational risk management compliance is highlighted. Accordingly, the board of directors and senior management should provide the required

leadership so that every bank employee is aware of their bank's risk culture that prioritises operational risk management compliance. The compliance function forms part of the second line of defence and should have sufficient authority, stature, independence and resources. This function should furthermore be able to report directly to the board of directors on crucial operational risk management concerns and issues.

8.4.3.5 Internal audit – based on LF_{38-39}, EF14

Ghanaian banks should improve the utilisation of the internal audit function as this will enable them to evaluate the effectiveness of their operational risk management practices and governance processes. It will also support the optimal functioning of the 3LOD risk operating model. To further advance the functionality of the internal audit function regarding operational risk management, the following implementation measures are important:

- The risk culture should support and encourage operational risk management.
- The internal audit function should have unrestricted access to the board of directors and the bank's senior management team.

8.4.3.6 Disclosure and transparency – based on LF_{42}, EF_{15}, EF_{20}, EF_{38}, EF_{46}, EF_{49}

Ghanaian banks should improve the disclosure and transparency of operational risk management information by building a risk culture that supports and encourages effective operational risk management practices. This will enable all stakeholders to determine if the banks identify, assess, monitor and control operational risks effectively and efficiently and therefore promote market discipline.

8.4.3.7 The bank supervisor – based on LF_{43-44}, EF_{16}, EF_{39}, EF_{47}

The Bank of Ghana has the overall supervisory and regulatory authority in Ghana and is responsible for aiding Ghanaian banks by making supervisory resources available on a proportionate basis. Therefore, it is recommended that the Bank of Ghana prioritise the following considerations:

- Relevant and appropriate supervision can only be attained by frequent interaction and communication with the Ghanaian banks on matters concerning operational risk management and challenges experienced with implementing the operational risk requirements of the Basel III regulatory framework.
- Liaising and networking with the BCBS to build a conducive working relationship will be beneficial. Firstly, this initiative could advance the Bank of Ghana's understanding of the operational risk management requirements of the Basel III regulatory framework, which will enable them to provide more accurate and appropriate guidance to Ghanaian banks. Secondly, this initiative would provide the BCBS with an improved understanding of the Ghanaian banking environment, enabling it to support the Bank of Ghana in formulating guidelines for Ghanaian banks.
- The guiding tools that could be considered include: on- and off-site monitoring of operational risk management practices, conducting interviews with relevant Ghanaian bank personnel on operational risk management issues and concerns, encouraging banks to conduct operational risk management self-assessments, and offering regular training interventions.
- Regular training interventions should be offered to Ghanaian banks on the following topics:
    - Prescribing the appropriate governance structures to enable successful operational risk management.
    - Establishing robust risk culture infrastructures to promote effective operational risk management.
    - Implementing the operational risk management principles of the Basel III regulatory framework successfully.
    - Utilising all of the operational risk management tools to identify and access operational risks − with a focus on: internal data collection and analysis, business process mapping, scenario analysis, stress testing and comparative analysis.
    - Aiding in the design and shaping of the internal control environment.

8.5 Synopsis of implementation guidelines for Ghanaian bank

Table 8.7 present a synopsis of the implementation guidelines to Ghanaian banks to enhance operational risk management, followed by an implementation scorecard (table 8.8) to assist Ghanaian banks in tracking their progress of implementing the developed guidelines.

Table 8.7: Synopsis of implementation guidelines

OPERATIONAL RISK MANAGEMENT PRACTICES	
Operational risk management tools	
Internal losses: Data collection and analysis	• Internal data collection and analysis activities should be clearly defined at all the bank's business units. • The senior management team must promote the importance of integrity and maintaining high ethical standards regarding internal controls to all bank personnel. • Senior management should monitor internal controls carefully.
Business process mapping	• Business process mapping must be utilised as it will allow for better identification and understanding of the operational risks and the way operational risks are interconnected with other risks to ensure optimal decision-making and management.
Scenario analysis	• The operational risk management department should regularly collaborate with the senior management team when conducting scenario building and analyses. • Training interventions on improving the utilisation of scenario building and analyses should be prioritised.
Stress testing	• Stress testing should be conducted on the scenarios developed during scenario analysis as this will assist in the proactive management of operational risks and enhance the absorption of operational risk losses.
Comparative analysis	• To identify the effectiveness and the deficiencies of the other operational risk management tools comparative analyses should be used as it will enable the accurate comparison of the results obtained from the other operational risks management tools.

Monitoring and reporting of operational risks	
	• Monitoring and reporting activities should be in place at board level, senior management level, as well as within all the business lines of the bank. • Senior management must ensure that monitoring and reporting activities occur regularly. • The operational risk reports should describe the operational risk profile of the bank by providing internal financial, operational, and compliance indicators as well as external market and environmental information about events and conditions that affect decision-making.
RISK CULTURE PRACTICES	
Risk culture driver	
Risk competence	• Recruit, retain and develop experienced and knowledgeable bank employees with the necessary knowledge, skills, attitudes, values and attributes to manage operational risks successfully. • Offer regular training opportunities to all staff members at different hierarchical levels on managing operational risk in accordance with the Basel III regulation. • The training interventions should pay particular attention to the following key areas: - Creating awareness among bank employees of the importance of operational risk management. - Fostering a stimulating environment where knowledge of, and competencies in, operational risk management are cultivated, valued and developed. - Eliminating the perception among staff members that operational risk management should only occur re-actively.

	- Emphasising a proactive approach, which is more beneficial to the strategy setting and resilience of banks. - Explaining the value of successful operational risk management practices by creating a competitive advantage and contributing towards the financial well-being, stability and resilience of the banks and the entire banking sector. - Clarifying the operational risk management requirements of the Basel III regulatory framework.
Organisation	• The correct procedures, processes and governance systems should be established to provide the ideal infrastructure for successful operational risk management. • The board of directors must ensure that the correct tone is set at the bank's top in which operational risk management is prioritised, acknowledged, and rewarded. • Senior management should ensure that every bank employee understands, supports and exercises such a risk culture. • The risk culture should be periodically reviewed and adjusted to accommodate new trends, attitudes and perceptions of operational risk and its management. • The risk culture should closely align with the risk governance practices.
Relationships	• Structured communication channels should be established to ensure operational risks are timeously identified, correctly understood, and appropriately managed. • The board of directors and senior management are responsible for establishing and maintaining the communication channels for operational risk information to flow vertically and horizontally throughout the bank.

	• The senior management personnel should support bank staff so that operational risk management information is effectively communicated, correctly interpreted, and successfully managed. • The communication of operational risk information between staff members should be a continuous, interactive process of providing, sharing and obtaining accurate information. • The following communication channels should be improved: - Upwards communication to senior management from the different business lines. - Upwards communication to the board of directors from senior management. - Downwards communication from the board of directors to senior management. - Downwards communication from senior management to the different business lines. - Communication across the different business lines.
Motivation	• An incentive system and a whistleblowing policy should be instituted to promote prudent risk-taking and accurate decision-making, and these should include the following characteristics: A) Incentive system: - A congruence between the bank's operational risk management objectives and the personal objectives of its employees should exist. - Employees must be motivated to exercise operational risk management practices effectively and efficiently. - Knowledgeable, experienced and motivated bank employees in the field of operational risk management should be attracted and retained. B) Whistleblowing policy:

	- Misconduct and malpractice should be addressed swiftly before regulatory action is required. - All bank personnel should understand that any wrongdoing is taken seriously. - A commitment should exist to identify poor and unlawful behaviour, and this should be reinforced with appropriate corrective measures. • The opportunity should exist to reinforce the expected operational risk management standards.
RISK GOVERNANCE PRACTICES	
Component	
The 3LOD risk operating model	To enable the successful operation of the 3LOD risk operating model, the following measures are important: • A definite separation of duties should be established between each line of defence, with no breaches in coverage. • Clear and effective communication channels should be established between the 3LOD, the board of directors, senior management personnel and external bodies. • A risk culture should exist that supports and encourages the effective utilisation of the 3LOD risk operating model.
The CRO	• The CRO should be independent and have specific responsibilities distinct from other executive functions in the bank. • The CRO should have access to any operational risk management information required to perform their responsibilities effectively. • The CRO should have unhindered access and a direct reporting line to the board of directors and the CEO of the bank.

	• The CRO and board of directors must interact and communicate regularly, ensuring that the bank's operational risk management strategy remains relevant and effective.
Operational risk management department (ORD)	• The ORD should be positioned so that a holistic perspective of the bank's operational risk profile is obtained. • The ORD should form part of the second line of defence. • The head of operational risk should chair the ORD. • The ORD should report to the CRO.
Compliance function	• Compliance concerns every bank employee; therefore, the board of directors and senior management should highlight the importance of operational risk management compliance. • The compliance function should form part of the second line of defence and have sufficient authority, stature, independence and resources. • The compliance function should be able to report directly to the board of directors on vital operational risk management concerns and issues.
Internal audit function	• The utilisation of the internal audit function should be improved as this will enable the evaluation of the effectiveness of operational risk management practices and governance processes. • To further advance the functionality of the internal audit function regarding operational risk management, the following implementation measures are important: - The internal audit function should have unrestricted access to the board of directors and the bank's senior management team.
Disclosure and transparency	• The disclosure and transparency of operational risk management information should be improved by building a risk culture that supports and encourages effective operational risk

	management practices. This will enhance market discipline as all stakeholders will be able to determine if the bank can identify, assess, monitor and control operational risks effectively and efficiently.
The bank supervisor	• The bank supervisor should prioritise the following measures: - Frequent interaction and communication with banks on matters concerning operational risk management. - Frequent interaction and communication with banks on challenges experienced with implementing the operational risk requirements of the Basel III regulatory framework. - Liaising and networking with the BCBS to build a conducive working relationship, with the aim of: o Advancing the Bank of Ghana's understanding of the operational risk management requirements of the Basel III regulatory framework. o Empowering the Bank of Ghana to provide more accurate and appropriate support to Ghanaian banks. o Provide the BCBS with a better understanding of the Ghanaian banking environment, enabling it to appropriately support the Bank of Ghana. - Offering training opportunities to banks on the following topics: o Governance structures to support effective operational risk management. o Implementation of the operational risk management principles of the Basel III regulatory framework.

	○ The utilisation of operational risk management tools, with a specific focus on: internal data collection and analysis, business process mapping, scenario analysis, stress testing and comparative analysis.

Source: Author (2022).

Table 8.8: Implementation scorecard: Ghanaian banks

OPERATIONAL RISK MANAGEMENT PRACTICES		**Not implemented**	**Partially implemented**	**Fully implemented**	**Total**	**Percentage** (higher % indicates higher implementation level)
Operational risk management tools						
Internal losses: Data collection and analysis	Internal data collection and analysis activities are clearly defined at all the business units.	1	2	3	/9	%
	The senior management team promote the importance of integrity and maintaining high ethical standards regarding internal controls to all personnel.	1	2	3		

	Senior management monitor internal controls carefully.	1	2	3		
Business process mapping	Business process mapping are utilised.	1	2	3	/3	%
Scenario analysis	The operational risk management department regularly collaborate with the senior management team.	1	2	3	/6	%
	Training interventions on improving the utilisation of scenario building and analyses are prioritised.	1	2	3		
Stress testing	Stress testing are conducted on the scenarios developed during scenario analysis.	1	2	3	/3	%
Comparative analysis	Comparative analyses are used to identify the effectiveness and the deficiencies of the other	1	2	3	/3	%

	operational risk management tools.					
Monitoring and reporting of operational risks		**Not implemented**	**Partially implemented**	**Fully implemented**	**Total**	**Percentage** (higher % indicates higher implementation level)
Monitoring and reporting of operational risks	Monitoring and reporting activities are in place at board level, senior management level, as well as within all the business lines of the bank.	1	2	3	/9	%
	Senior management ensure that monitoring and reporting activities occur regularly.	1	2	3		
	The operational risk reports provide internal financial, operational, and compliance indicators as well as external market and environmental information.	1	2	3		

RISK CULTURE PRACTICES RISK CULTURE DRIVERS		Not implemented	Partially implemented	Fully implemented	Total	Percentage (higher % indicates higher implementation level)
Risk competence	Experienced and knowledgeable bank employees with the necessary knowledge, skills, attitudes, values and attributes to manage operational risks successfully are recruited, retained and developed.	1	2	3	/6	%
	Regular training opportunities are offered to all staff members on managing operational risk in accordance with the Basel III regulation.	1	2	3		
Organisation	The correct procedures, processes and governance systems are established to provide the	1	2	3	/15	%

	ideal infrastructure for successful operational risk management.					
	The board of directors ensure that the correct tone is set at the bank's top in which operational risk management is prioritised, acknowledged, and rewarded.	1	2	3		
	Senior management ensure that every bank employee understands, supports, and exercises such a risk culture.	1	2	3		
	The risk culture is periodically reviewed and adjusted to accommodate new trends, attitudes and perceptions of operational risk and its management.	1	2	3		
	The risk culture is closely aligned with the risk	1	2	3		

	governance practices of the bank.					
Relationships	Structured communication channels are established to ensure operational risks are timeously identified, correctly understood, and appropriately managed.	1	2	3	/15	%
	The board of directors and senior management have established and maintained the correct communication channels for operational risk information to flow vertically and horizontally throughout the bank.	1	2	3		
	The senior management provide appropriate support to bank employees so that operational risk management information is effectively	1	2	3		

	communicated, correctly interpreted, and successfully managed.					
	The communication of operational risk information between staff members are a continuous, interactive process of providing, sharing and obtaining accurate information.	1	2	3		
	The following communication channels are in place: • Upwards communication to senior management from the different business lines. • Upwards communication to the board of directors from senior management.	1	2	3		

	• Downwards communication from the board of directors to senior management. • Downwards communication from senior management to the different business lines. • Communication across the different business lines.					
Motivation	An incentive system and a whistleblowing policy are instituted to promote prudent risk-taking and accurate decision-making.	1	2	3	/3	%
RISK GOVERNANCE PRACTICES **Component**		**Not implemented**	**Partially implemented**	**Fully implemented**	**Total**	**Percentage** (higher % indicates higher implementation level)

The 3LOD risk operating model	A separation of duties is established between each line of defence, with no breaches in coverage.	1	2	3	/9	%
	Clear and effective communication channels are established between the 3LOD, the board of directors, senior management personnel and external bodies.	1	2	3		
	The risk culture supports and encourages the effective utilisation of the 3LOD risk operating model.	1	2	3		
The CRO	The CRO are independent and have specific responsibilities distinct from other executive functions in the bank.	1	2	3	/12	%
	The CRO have access to any operational risk management information	1	2	3		

	required to perform their responsibilities effectively.					
	The CRO have unhindered access and a direct reporting line to the board of directors and the CEO of the bank.	1	2	3		
	The CRO and board of directors interact and communicate regularly, ensuring that the bank's operational risk management strategy remains relevant and effective.	1	2	3		
Operational risk management department (ORD)	The ORD is positioned so that a holistic perspective of the bank's operational risk profile is obtained.	1	2	3	/12	%
	The ORD forms part of the second line of defence.	1	2	3		
	The head of operational risk chair the ORD.	1	2	3		

	The ORD reports to the CRO.	1	2	3		
Compliance function	The board of directors and senior management highlight the importance of operational risk management compliance.	1	2	3	/12	%
	The compliance function form part of the second line of defence.	1	2	3		
	The compliance function has sufficient authority, stature, independence and resources.	1	2	3		
	The compliance function report directly to the board of directors on vital operational risk management concerns and issues.	1	2	3		
Internal audit function	The internal audit function has unrestricted access to the board of directors and	1	2	3	/3	%

	the bank's senior management team.					
Disclosure and transparency	The risk culture supports and encourages accurate disclosure and transparency of operational risk management information.	1	2	3	/3	%
The bank supervisor	Prioritises frequent interaction and communication with banks on matters concerning operational risk management.	1	2	3	/12	%
	Prioritises frequent interaction and communication with banks on challenges experienced with implementing the operational risk requirements of the Basel III regulatory framework.	1	2	3		

	Liaises and networks with the BCBS to build a conducive working relationship.	1	2	3		
	Offers training opportunities to banks on: • Governance structures to support operational risk management. • Implementing of the operational risk management principles of the Basel III regulatory framework. • Effectively utilising internal data collection and analysis, business process mapping, scenario analysis, stress testing and comparative analysis.	1	2	3		

Source: Author (2022).

8.6 Limitations of the study

The study's findings should be interpreted with the following limitations in mind:

- The data-collection phase of this study was done over 22 weeks. A longitudinal study spanning multiple years could be considered for future research purposes. Such an approach would allow the collection of additional information and observe how specific variables change over time, enabling the refinement of the guidelines presented in this study.
- Although the results presented in this study could be utilised to stimulate similar research in banks operating in other developing countries, the results cannot be generalised to banks operating outside Ghanaian borders. Banks operating in other countries have unique risk profiles, operations and challenges.

8.7 Recommendations for future research

Particular areas that warrant further research are the following:

8.7.1 Other African countries

Studies of a similar nature and purpose should be conducted for banks operating in other developing African countries as the majority of African countries are struggling with Basel III compliance. Such studies will be beneficial as they will improve these banks' operational risk management practices and advance their financial stability, risk resilience and sustainability.

8.7.2 Emerging risks

Research on emerging operational risks, such as ICT risks for banks operating in Ghana, is necessary since all banks have become increasingly dependent on information technology. Banks can advance their operational risk management practices and adapt to volatile banking environments by effectively managing ICT risks, since the effective management of ICT risks have become critical for banks.

8.7.3 The bank regulator

To further advance compliance with the operational management requirements of the Basel III regulatory framework, additional research should be undertaken to assist the Bank of Ghana in developing and embedding an operational risk management program in its risk-based supervision mandate. This program should focus on reducing compliance costs.

8.7.4 Credit risk and market risk

Research on improving the credit- and market risk management practices of Ghanaian banks would be beneficial as these two risk categories form principal components of the Basel III regulatory framework. This would further assist Ghanaian banks to comply with Basel III risk management requirements .

8.8 A final word to conclude the study

The principal objective of this study was to develop guidelines for Ghanaian banks to enhance their compliance with the operational risk management requirements outlined by the Basel III regulatory framework.

Theoretical contribution:

The study has contributed to the theoretical body of knowledge in the field of operational risk. It was found that banks could enhance the management of operational risk by paying particular attention to their risk culture- and risk governance practices. By ensuring that risk culture and risk governance are aligned to support effective operational risk management, the banks' level of compliance with the operational risk management requirements of the Basel III regulatory framework will be improved.

Practical contribution:

By adopting the guidelines provided in this study, Ghanaian banks will make significant progress towards improving their operational risk management-, risk culture- and risk governance practices, which will collectively advance the financial stability and resilience of Ghanaian banks and the Ghanaian banking sector.

The implications for practice, furthermore, lie in the fact that the BCBS should prioritise the importance of engaging and collaborating with central banks, supervisory authorities, research institutions and academia in both developed- and developing countries with regard to the implementation challenges that banks experience in complying with the requirements of the Basel III regulatory framework. This initiative is particularly important for banks operating in developing countries, such as Ghana. These banks face unique challenges and have different infrastructures and resources than banks in developed economies. Enhancing the level of compliance with the Basel III regulatory framework will improve the financial stability of individual banks and, more importantly, will significantly contribute to creating a more resilient global banking sector and promoting economic growth and prosperity.

Future research

This study is foundational for future research, where the focus will be on advancing the operational risk management practices of banks operating in developing African economies and improving the level of Basel III compliance for banking institutions operating on the African continent.

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Appendix A – Data-collection instrument

Questionnaire April 2019

Dear participant,

I (Gerhard Grebe), a Doctoral student at the University of South Africa under the supervision of Prof. J Marx, am undertaking a research project to gather information from banks in Ghana concerning their perspective on the Basel Regulatory Frameworks concerning the management of operational risk.

The purpose of this study will be to develop guidelines for Ghanaian banks to enhance the level of operational risk management compliance with the Basel III regulatory framework, considering their unique business models, risk profiles and banking operations. This tailoring approach will benefit banks in Ghana, as it will improve the management of operational risk and contribute towards Basel III compliance, which in return equates to improved financial stability and sustainability in the country as well as the inflow of foreign currency.

To this end, I kindly request you to complete the following questionnaire. It should take no longer than 15 minutes of your time. Your response is of utmost importance and will be greatly appreciated. All responses will be treated strictly **confidential,** and the **anonymity** of participants is assured.

The results of this research will be for academic purposes, such as publishing academic articles. The summary of the results will also be compiled in a research report, which will be made available to you via e-mail upon request.

If you have any questions or comments regarding this questionnaire, please contact me at: +27 429 6723 or e-mail me at: grebegpm@unisa.ac.za. Alternatively, you can also contact Prof. J Marx at: marxj@unisa.ac.za

Sincerely yours,

Gerhard Grebe
Senior Lecturer - Department of Finance and Risk Management and Banking
University of South Africa

The questionnaire consists of questions divided into the following five sections:

- **SECTION 1**: General information
- **SECTION 2:** Questions about operational risk
- **SECTION 3:** Questions about the governance of operational risk
- **SECTION 4**: Questions about the risk culture with regard to operational risk management
- **SECTION 5:** Supplementary information

Section 1: General information

Please mark the chosen option with an X.

1. Please indicate the business lines offered by the bank you are currently working at: (you may mark more than one option)

Corporate Finance	
Trading and Sales	
Retail banking	
Commercial banking	
Payment and Settlement	
Retail brokerage	
Asset management	
Agency services	

2. Please indicate the number of years of experience you have working for a bank operating within the Ghanaian banking sector:

Number of years	

3. Please indicate the area of specialisation of the bank you are currently working at:

Risk management	
Corporate Governance & Compliance	
Finance, Investment & Accounting	
Treasury	
Internal audit	
Bank supervision	
Other (please specify)	

Section 2: Questions about operational risk

Please mark the chosen option with an X.

4. Please indicate the level of Basel I, II and III implementation with regards to the management of operational risk. (Please mark your answer with an X)

	Not implemented	**In the process**	**Fully implemented**	**Do not know**
Basel I				
Basel II				
Basel III				

Please mark the chosen option with an X.

5. Which of the following tools are utilised by your bank in identifying and assessing operational risk?

A: Operational risk management tools	Yes	No	Not sure
• Audit Findings			
• Internal Loss Data Collection and Analysis			
• External Data Collection and Analysis			
• Risk Assessments			
• Business Process Mapping			
• Risk and Performance indicators			
• Scenario Analysis			
• Stress Testing			
• Comparative analysis			

Please indicate with an X the extent to which the following monitoring and reporting processes are in place at the bank you are currently working at:

B: Monitoring and Reporting	To no extent	To a limited extent	To a large extent	To a very large extent
6. Operational risks are monitored and reported.				
7. Reporting mechanisms are in place at *board level* that support the proactive management of operational risk.				
8. Reporting mechanisms are in place at the *senior management level* that supports the proactive management of operational risk.				
9. Reporting mechanisms are in place at the *business-line level* that supports the proactive management of operational risk.				
10. Public disclosures of operational risk management information allow stakeholders to assess the bank's approach to operational risk management.				

Please indicate with an X your level of agreement with each of the following statements relating to the benefits of operational risk management at the bank you are currently working at:

C: The benefits of operational risk management	Strongly disagree	Disagree	Agree	Strongly agree
11. The effective management of operational risk assists with freeing up capital.				
12. The effective management of operational risk lowers profit and loss volatility in your bank.				
13. The effective management of operational risk is beneficial to your bank as it is regarded as a competitive advantage.				

Section 3: The governance of operational risk

14. Does your bank have a department that manages operational risk?

Yes	
No	
Not sure	

15. If you answered 'Yes' to question 14, to whom does this department report (you may mark more than one option)?

Board of directors	
Chief risk officer (CRO)	
Board risk management committee	
Senior management	

16. Does the Chief Risk Officer (CRO) of your bank serve as a member of the Board of Directors?

Yes, the CRO is a permanent member of the Board of Directors.	
No, the CRO is not a member of the Board of Directors.	
No, we do not have a CRO.	

17. To whom does the CRO directly report to? (Please choose one option only)

CEO of our bank	
CFO of our bank	
COO of our bank	
The Board of Directors of our bank	
The chairperson of the risk committee	
Internal audit	

The compliance department	

Please indicate with an x your level of agreement with each of the following statements:

A: Three Lines of Defence (3 LOD) risk operating model Line 1: Front office Line 2: Executive management, central risk management department and compliance Line 3: Internal audit	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**
18. Your bank utilises the 3 LOD risk operating model for the management of operational risk.				
19. The exact roles and responsibilities of each line of defence are communicated in your bank with regards to the management of operational risk.				
B: Compliance	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**
20. An independent compliance function exists at your bank.				
21. The compliance function reports directly to the board.				
22. The compliance function advises the board and senior management with regards to complying with laws and standards about operational risk.				

C: Internal audit	Strongly disagree	Disagree	Agree	Strongly agree
23. Internal audit performs periodic assessments of the bank's overall risk governance framework with regards to the management operational risk.				
24. Internal audit independently assesses the effectiveness and efficiency of operational risk management.				
D: Disclosure and transparency	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**
25. Your bank discloses key points concerning its risk exposures and risk management strategies with regards to the management of operational risk.				
26. Your bank discloses this information in such a manner that shareholders, depositors and other relevant stakeholders can access the information easily.				

E: The bank supervisor	Strongly disagree	Disagree	Agree	Strongly agree
27. Your bank receives regular guidance from the bank supervisor with regards to the governance and management of operational risk.				
28. The types of guidance received by the bank supervisor include:				
• Regular communication with the board of directors and senior management.				
• Interviews.				
• On and off-site monitoring.				
• Self- assessments.				
• Training.				

Section 4: Risk culture with regards to operational risk management

29. Does a culture exist at your bank that encourages communication, collaboration, and interaction between the different lines of defence regarding the management of operational risk? (Please mark your answer with an X)

Yes	
No	
Not sure	

30. Who has the responsibility to ensure that such a culture, as described in question 29, exists throughout the entire bank? (You may mark more than one option)

Board of directors	
Chief Risk Officer	
Senior management	
Operational risk committee	
Line management	
All staff members	

31. Please indicate the current level of implementation of such a culture (described at question 29) within your bank.

Not implemented	
Partially implemented	
Fully implemented	

32. Please indicate how the communication of operational risk occurs within your bank? (You may mark more than one option):

Upwards to senior management from the different business lines.	
Upwards to the board from senior management.	
Downwards from the board to senior management.	
Downwards from senior management to the different business lines.	

Across the different business lines.	

33. Please indicate the most important challenges with the culture (as described in question 29) that currently exist in your bank, regarding the management of operational risk.

Section 5: Supplementary information

This section aims to gain additional information and a better understanding of your answers in the previous sections.

34. In your opinion, is your bank experiencing any implementation challenges with the Basel III regulatory framework with regard to the management of operational risk?

Yes	
No	
Not sure	

35. If you answered yes to question 34, please indicate the challenges you are experiencing in your bank, concerning the management of operational risk (you may mark more than one option):

• Basel III does not provide sufficient flexibility with regards to the different business models of banks.	
• The complexity of the calculation methods used in Basel III to calculate capital requirements for operational risk, make implementation difficult.	
• Our bank does not have the financial resources to implement Basel III effectively.	
• Our bank's ICT (information and communication technology) systems make it difficult to implement Basel III effectively.	
• Our bank does not have sufficient human resources (competencies) to implement Basel III effectively.	
• The cost of complying with the Basel III requirements are too high for our bank.	
• Our bank thinks that by complying with Basel III the profitability of the bank will be reduced.	
• Our bank does not fully understand all the requirements of Basel III about operational risk.	
• Gaps in the governance of operational risk of our bank prevent proper implementation of the Basel III requirements about operational risk	

36. If you answered yes to question 34, please elaborate on the most important improvements of the Basel III regulatory framework, you would like to see with regards to the governance and management of operational risk.

Thank you for your time in participating in this research intervention.

If you would like to receive a report on the findings, please e-mail the researcher, as it is on request.

Gerhard Grebe grebegpm@unisa.ac.za

Appendix B – Informed-consent letter

Informed-consent letter to Ghanaian banks

Contact person:

Bank:

E-mail address:

Dear Sir/ Madam

I (Gerhard Grebe), a Doctoral student of the University of South Africa under the supervision of Professor J Marx is undertaking a research project to gather information from banks in Ghana concerning their perspective on the Basel Regulatory Frameworks with regards to the management of operational risk.

The purpose of this study will be to develop guidelines for Ghanaian banks to enhance the level of operational risk management compliance with the Basel III regulatory framework, considering their unique business models, risk profiles and banking operations. This tailoring approach will benefit banks in Ghana, as it will improve the management of operational risk and contribute towards Basel III compliance, which in return equates to improved financial stability and sustainability in the country as well as the inflow of foreign currency.

To this end, I kindly request you to complete the attached questionnaire. Taking part in this study is voluntary and you are under no obligation to consent to participation. You are free to withdraw (opt-out) at any time or stage during the completion of the questionnaire without providing any reason(s). The questionnaire should not take more than 15 minutes to complete. All the data obtained from you will be kept **confidential** and **anonymity** of participants are assured. All questionnaires will be concealed, and no one

other than the primary researcher and promoter will have access to the completed questionnaires.

There are no direct benefits to participants in this research project. The results of this research project will be presented in a thesis and for the purpose of publishing academic articles. At no time, however, will the identity of the bank you are working for be disclosed or any identifying information be revealed. If you wish to receive a copy of the results from this research project, you are welcome to contact one of the researchers at the contact details given below.

Electronic copies of your answers will be stored by the researcher for a period of five years on a password-protected computer. Future use of the stored data will be subject to further research ethics review and approval if applicable. After the five-year period, all information will be permanently deleted.

Should you have any questions or comments regarding this questionnaire, please contact me on: +27 429 6723 or e-mail me at: grebegpm@unisa.ac.za. Alternatively, you can also contact Professor J. Marx at: marxj@unisa.ac.za

If you have any other questions regarding your rights as a participant in this research, you may also contact the College Research Ethics Review Committee of the University of South Africa via email at: engelm1@unisa.ac.za

Thank you for taking the time to read this informed-consent letter and availing yourself to participate in this research project. Please note that by completing the questionnaire you agree that you understand the information communicated to you and that you voluntarily agree to participate.

Sincerely Yours

……
Mr. GPM Grebe

Appendix C – Ethical clearance certificate

UNISA university of south africa

FINANCE, RISK MANAGEMENT & BANKING RESEARCH ETHICS REVIEW COMMITTEE

21 April 2017

Ref #: 2017/CEMS/DFRB/005
Name of applicant: Mr GPM Grebe
Student #: 50543474
Supervisor: Prof J Marx
Staff #: 1978438

Dear Mr GPM Grebe

Decision: Ethics Approval

Name: Mr GPM Grebe, grebegpm@unisa.ac.za, 012 429 6723

Supervisor: Prof J Marx, marxj@unisa.ac.za, 082 883 1772

Proposal: A revised Basel Framework for banks operating in East and West Africa

Qualification: PhD

Thank you for the application for research ethics clearance by the Department of Finance, Risk Management and Banking Research Ethics Review Committee for the above mentioned research. Final approval is granted for the duration of the project.

For full approval: The application was reviewed in compliance with the Unisa Policy on Research Ethics by the DFRB RERC 10 April 2017.

The proposed research may now commence with the proviso that:

1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the department of Finance, Risk Management and Banking Ethics Review Committee. An amended application could be requested if there are substantial changes from the existing proposal,

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especially if those changes affect any of the study-related risks for the research participants.

3) The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.

Note:

The reference number 2017/CEMS/DFRB/005 should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants, as well as with the [DFRB] RERC.

Kind regards,

Mutezo

pp Mulaudzi

Prof Ashley Mutezo
Chairperson: DFRB Research Ethics Review Committee
0124294595/muteza@unisa.ac.za

Prof Thomas Mogale
Executive Dean: CEMS

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Appendix D – Multiple regression SPSS outputs

Regression model 1		
Notes		
Output Created		
Comments		
Input	Data	
	Active Dataset	DataSet1
	Filter	Q1Bank_demographics_NUM = 1 | Q1Bank_demographics_NUM = 2 | Q1Bank_demographics_NUM = 3 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	57
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT Q12_Q14_Value_of_operational_risk_management /METHOD=ENTER BaselIII_recoded_dummy Q6_total_risk_management_tools /SCATTERPLOT=(*ZPRED ,*ZRESID) /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID) /CASEWISE PLOT(ZRESID) OUTLIERS(3) /SAVE MAHAL COOK LEVER ZRESID.
Resources	Processor Time	00:00:01,00
	Elapsed Time	00:00:00,68
	Memory Required	10352 bytes
	Additional Memory Required for	880 bytes

	Residual Plots	
Variables Created or Modified	ZRE_4	Standardized Residual
	MAH_4	Mahalanobis Distance
	COO_4	Cook's Distance
	LEV_4	Centered Leverage Value

Descriptive Statistics

	Mean	Std. Deviation	N
Value of operational risk management	3,34	0,440	51
Basel III	0,65	0,483	51
Total risk management tools	6,69	2,044	51

Correlations

		Value of operational risk management	Basel III	Total risk management tools
Pearson Correlation	Value of operational risk management	1,000	0,294	0,418
	Basel III	0,294	1,000	0,372
	Total risk management tools	0,418	0,372	1,000
Sig. (1-tailed)	Value of operational risk management		0,018	0,001
	Basel III	0,018		0,004
	Total risk management tools	0,001	0,004	
N	Value of operational risk management	51	51	51
	Basel III	51	51	51
	Total risk management tools	51	51	51

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Total risk management tools, Basel III[b]		Enter

a. Dependent Variable: Value of operational risk management

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.444[a]	0,197	0,163	0,402	1,423

a. Predictors: (Constant), Total risk management tools, Basel III

b. Dependent Variable: Value of operational risk management

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,901	2	0,951	5,877	.005[b]
	Residual	7,763	48	0,162		
	Total	9,664	50			

a. Dependent Variable: Value of operational risk management

b. Predictors: (Constant), Total risk management tools, Basel III

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	2,731	0,194		14,039	0,000	2,339	3,122		
	Basel III	0,146	0,127	0,161	1,153	0,255	-0,109	0,402	0,862	1,161
	Total risk management tools	0,077	0,030	0,358	2,568	0,013	0,017	0,137	0,862	1,161

a. Dependent Variable: Value of operational risk management

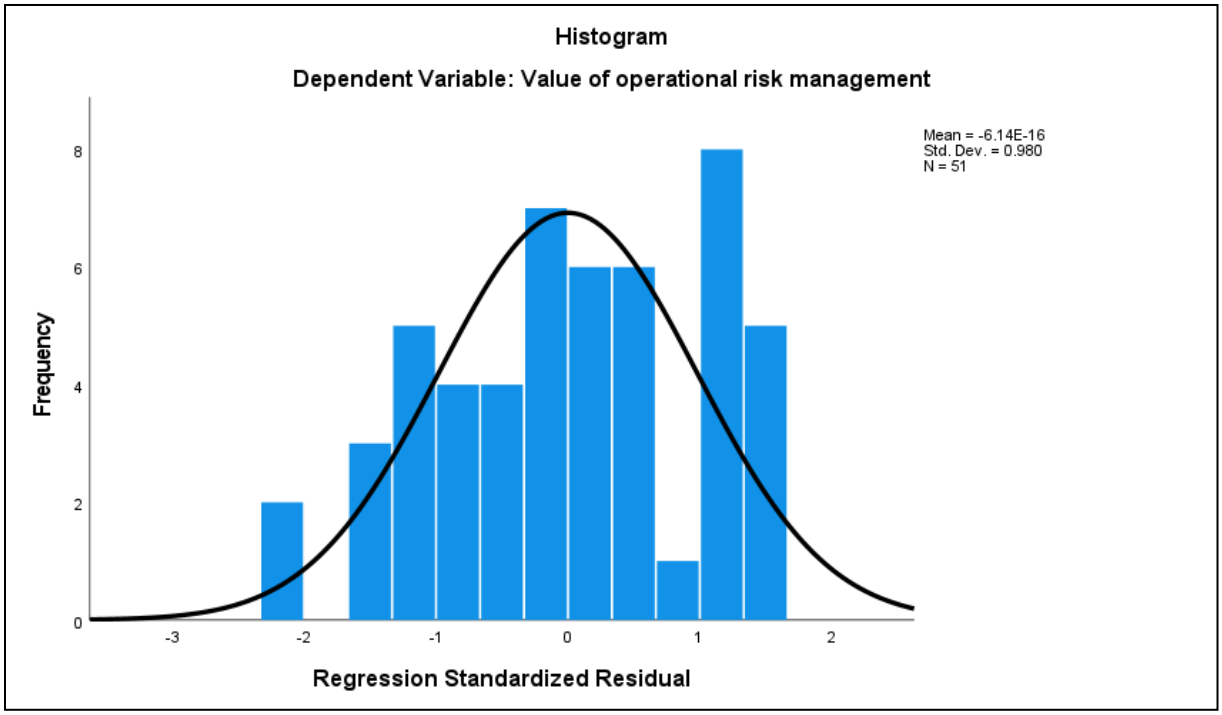
Collinearity Diagnostics[a]

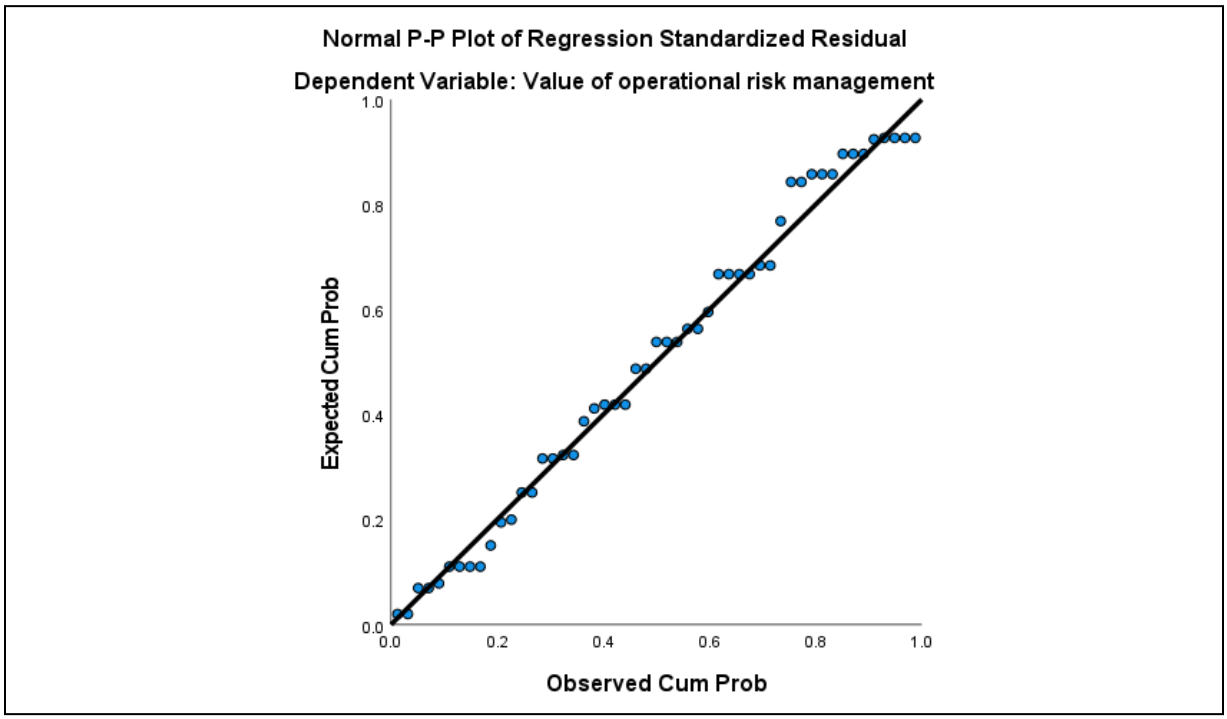
	Eigenvalue		Variance Proportions

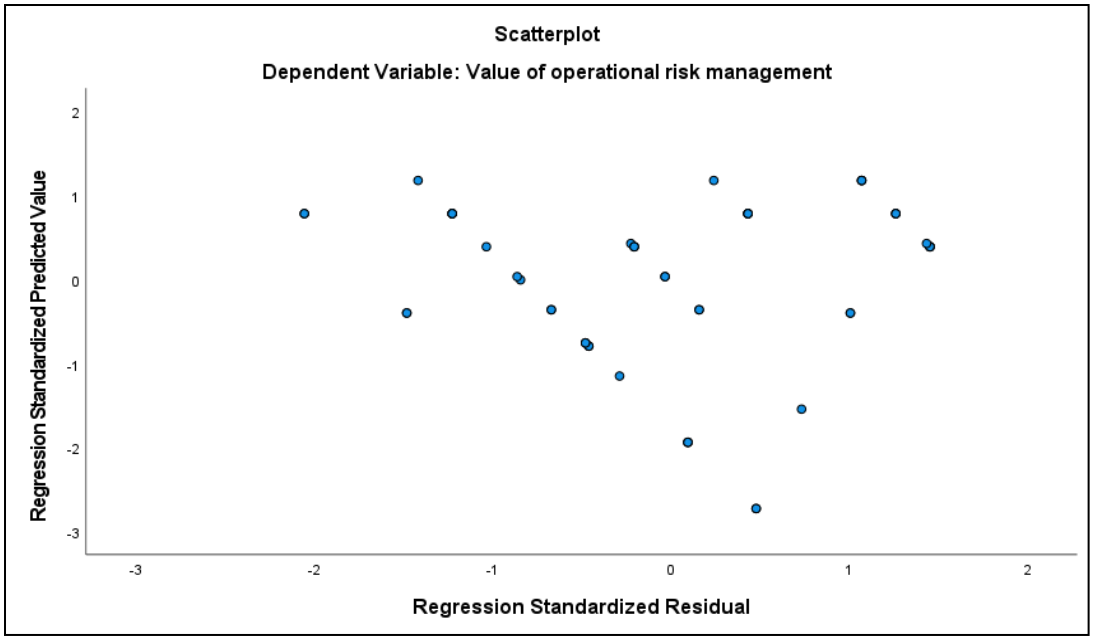
Model			Condition Index	(Constant)	Basel III	Total risk management tools
1	1	2,732	1,000	0,01	0,03	0,01
	2	0,227	3,471	0,08	0,92	0,03
	3	0,041	8,142	0,91	0,05	0,96
a. Dependent Variable: Value of operational risk management						

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2,81	3,57	3,34	0,195	51
Std. Predicted Value	-2,730	1,178	0,000	1,000	51
Standard Error of Predicted Value	0,070	0,169	0,094	0,025	51
Adjusted Predicted Value	2,77	3,60	3,34	0,199	51
Residual	-0,826	0,584	0,000	0,394	51
Std. Residual	-2,054	1,453	0,000	0,980	51

Stud. Residual	-2,089	1,526	0,001	1,003	51
Deleted Residual	-0,855	0,653	0,001	0,413	51
Stud. Deleted Residual	-2,168	1,549	-0,001	1,016	51
Mahal. Distance	0,551	7,845	1,961	1,710	51
Cook's Distance	0,000	0,103	0,016	0,019	51
Centered Leverage Value	0,011	0,157	0,039	0,034	51
a. Dependent Variable: Value of operational risk management					


Histogram
Dependent Variable: Value of operational risk management
Mean = -6.14E-16
Std. Dev. = 0.980
N = 51
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Value of operational risk management
Expected Cum Prob
Observed Cum Prob


Scatterplot
Dependent Variable: Value of operational risk management
Regression Standardized Predicted Value
Regression Standardized Residual
2
1
0
-1
-2
-3
-3
-2
-1
0
1
2

Regression model 2		
Notes		
Output Created		
Comments		
Input	Data	
	Active Dataset	DataSet1
	Filter	Q1Bank_demographics_NUM = 1 | Q1Bank_demographics_NUM = 2 | Q1Bank_demographics_NUM = 3 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	57
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT Q12_Q14_Value_of_operational_risk_management /METHOD=ENTER BaselIII_recoded_dummy Q34_risk_culture_dummy_coded /SCATTERPLOT=(*ZPRED ,*ZRESID) /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID) /CASEWISE PLOT(ZRESID) OUTLIERS(3) /SAVE MAHAL COOK LEVER ZRESID.
Resources	Processor Time	00:00:01.16
	Elapsed Time	00:00:00.50
	Memory Required	10384 bytes
	Additional Memory Required for Residual Plots	880 bytes
Variables Created or Modified	ZRE_4	Standardized Residual
	MAH_4	Mahalanobis Distance
	COO_4	Cook's Distance

	LEV_4	Centered Leverage Value

Descriptive Statistics			
	Mean	Std. Deviation	N
Value of operational risk management	3,33	0,436	49
Basel III	0,63	0,487	49
Risk culture	0,47	0,504	49

Correlations				
		Value of operational risk management	Basel III	Risk culture
Pearson Correlation	Value of operational risk management	1,000	0,295	-0,126
	Basel III	0,295	1,000	0,038
	Risk culture	-0,126	0,038	1,000
Sig. (1-tailed)	Value of operational risk management		0,020	0,193
	Basel III	0,020		0,398
	Risk culture	0,193	0,398	
N	Value of operational risk management	49	49	49
	Basel III	49	49	49
	Risk culture	49	49	49

Variables Entered/Removed[a]			
Model	Variables Entered	Variables Removed	Method
1	Risk culture, Basel III[b]		Enter
a. Dependent Variable: Value of operational risk management			
b. All requested variables entered.			

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.325[a]	0,106	0,067	0,421	1,522
a. Predictors: (Constant), Risk culture, Basel III					
b. Dependent Variable: Value of operational risk management					

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0,963	2	0,482	2,719	.043[b]
	Residual	8,148	46	0,177		
	Total	9,111	48			
a. Dependent Variable: Value of operational risk management						
b. Predictors: (Constant), Risk culture, Basel III						

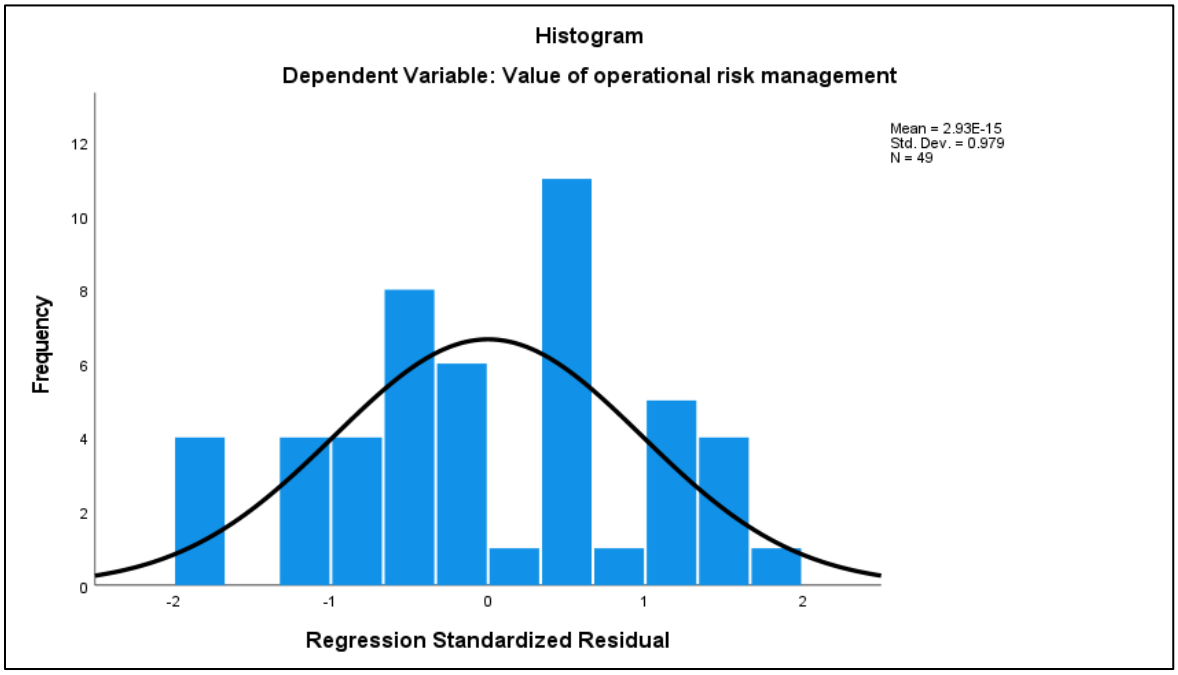
Coefficients[a]										
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	3,220	0,113		28,556	0,000	2,993	3,447		
	Basel III	0,268	0,125	0,300	2,148	0,037	0,017	0,519	0,999	1,001
	Risk culture	-0,119	0,121	-0,138	-0,988	0,328	-0,362	0,124	0,999	1,001
a. Dependent Variable: Value of operational risk management										

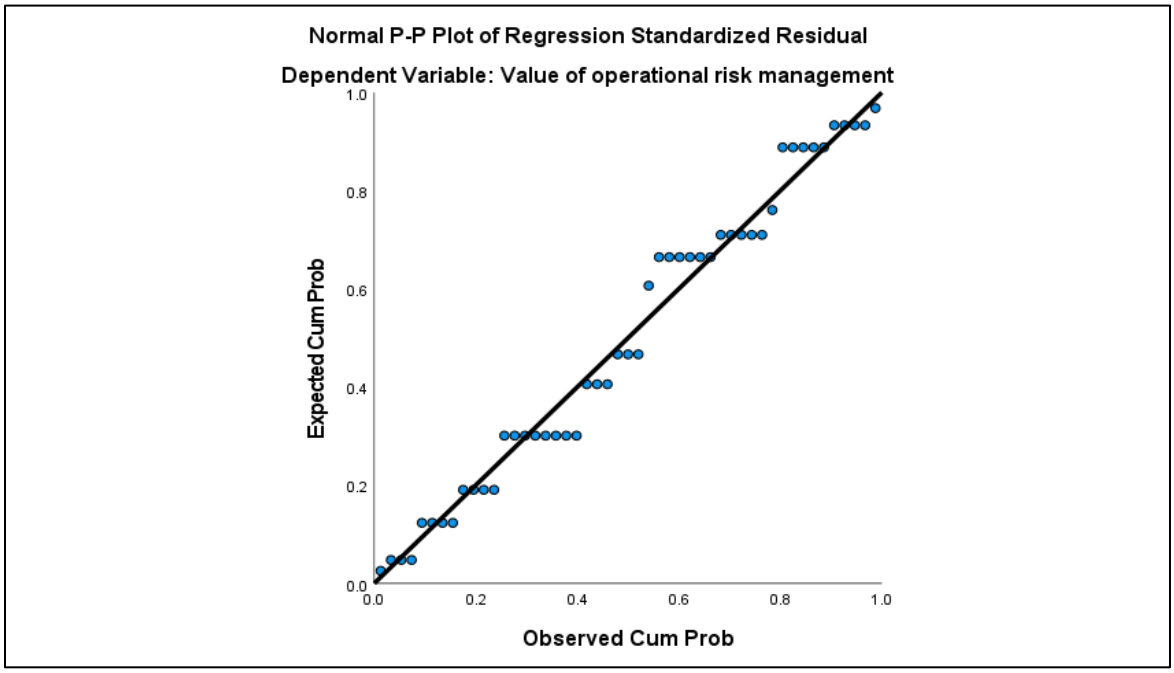
Collinearity Diagnostics[a]						
Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	Basel III	Risk culture
1	1	2,366	1,000	0,04	0,05	0,07
	2	0,452	2,288	0,02	0,27	0,75

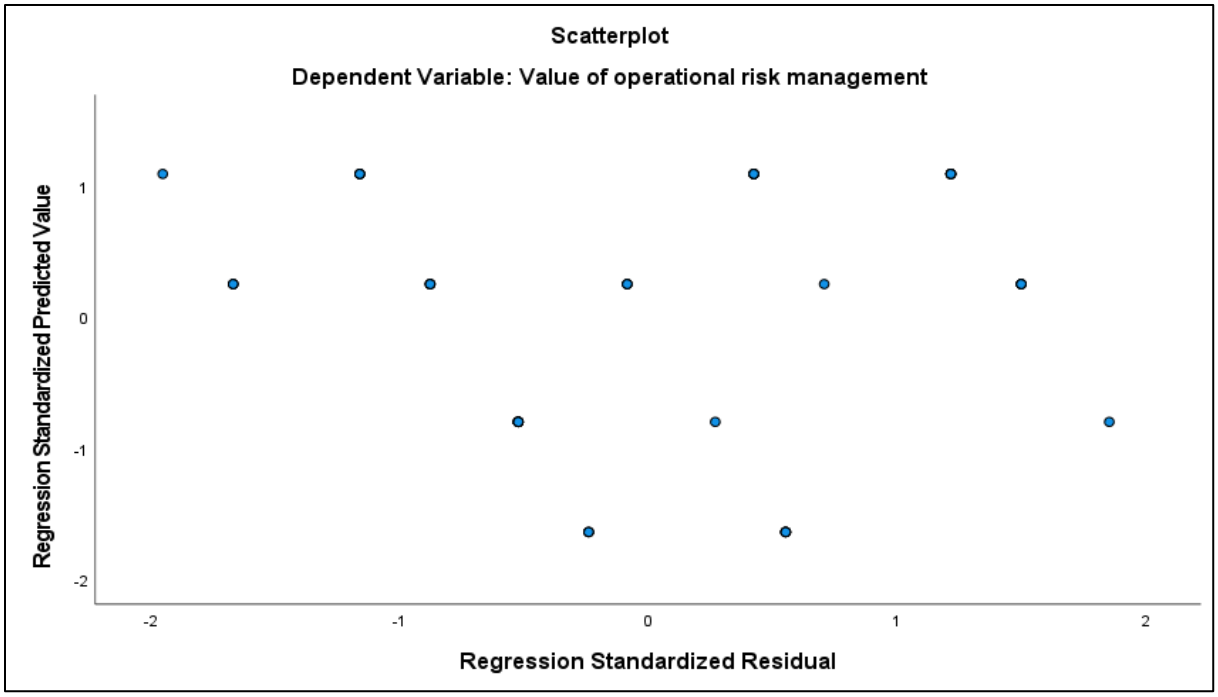
	3	0,182	3,606	0,94	0,68	0,18
a. Dependent Variable: Value of operational risk management						

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3,10	3,49	3,33	0,142	49
Std. Predicted Value	-1,644	1,090	0,000	1,000	49
Standard Error of Predicted Value	0,095	0,120	0,104	0,010	49
Adjusted Predicted Value	3,08	3,53	3,33	0,144	49
Residual	-0,821	0,780	0,000	0,412	49
Std. Residual	-1,951	1,854	0,000	0,979	49
Stud. Residual	-2,003	1,925	0,000	1,008	49
Deleted Residual	-0,866	0,841	0,000	0,437	49
Stud. Deleted Residual	-2,074	1,985	0,000	1,021	49
Mahal. Distance	1,491	2,903	1,959	0,558	49
Cook's Distance	0,000	0,095	0,020	0,021	49

Centered Leverage Value	0,031	0,060	0,041	0,012	49
a. Dependent Variable: Value of operational risk management					







Regression model 3		
Notes		
Output Created		
Comments		
Input	Data	
	Active Dataset	DataSet1
	Filter	Q1Bank_demographics_NUM = 1 | Q1Bank_demographics_NUM = 2 | Q1Bank_demographics_NUM = 3 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	57
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.

	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT Q28_Q29_Disclosure_and_transparency /METHOD=ENTER BaselIII_recoded_dummy Q34_risk_culture_dummy_coded /SCATTERPLOT=(*ZPRED ,*ZRESID) /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID) /CASEWISE PLOT(ZRESID) OUTLIERS(3) /SAVE MAHAL COOK LEVER ZRESID.
Resources	Processor Time	00:00:00.36
	Elapsed Time	00:00:00.31
	Memory Required	11024 bytes
	Additional Memory Required for Residual Plots	880 bytes
Variables Created or Modified	ZRE_8	Standardized Residual
	MAH_8	Mahalanobis Distance
	COO_8	Cook's Distance
	LEV_8	Centered Leverage Value

Descriptive Statistics			
	Mean	Std. Deviation	N
Disclosure and transparency	3,2959	0,53927	49
Basel III	0,63	0,487	49

Risk culture	0,47	0,504	49

Correlations				
		Disclosure and transparency	Basel III	Risk culture
Pearson Correlation	Disclosure and transparency	1,000	0,145	0,245
	Basel III	0,145	1,000	0,038
	Risk culture	0,245	0,038	1,000
Sig. (1-tailed)	Disclosure and transparency		0,160	0,045
	Basel III	0,160		0,398
	Risk culture	0,045	0,398	
N	Disclosure and transparency	49	49	49
	Basel III	49	49	49
	Risk culture	49	49	49

Variables Entered/Removed[a]			
Model	Variables Entered	Variables Removed	Method
1	Risk culture, Basel III[b]		Enter
a. Dependent Variable: Disclosure and transparency			
b. All requested variables entered.			

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.280[a]	0,078	0,038	0,52887	1,487
a. Predictors: (Constant), Risk culture, Basel III					
b. Dependent Variable: Disclosure and transparency					

ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.

1	Regression	1,093	2	0,546	1,953	.0157[b]
	Residual	12,866	46	0,280		
	Total	13,959	48			
a. Dependent Variable: Disclosure and transparency						
b. Predictors: (Constant), Risk culture, Basel III						

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	3,081	0,142		21,743	0,000	2,795	3,366		
	Basel III	0,150	0,157	0,136	0,958	0,343	-0,165	0,466	0,999	1,001
	Risk culture	0,256	0,152	0,240	1,691	0,036	-0,049	0,561	0,999	1,001
a. Dependent Variable: Disclosure and transparency										

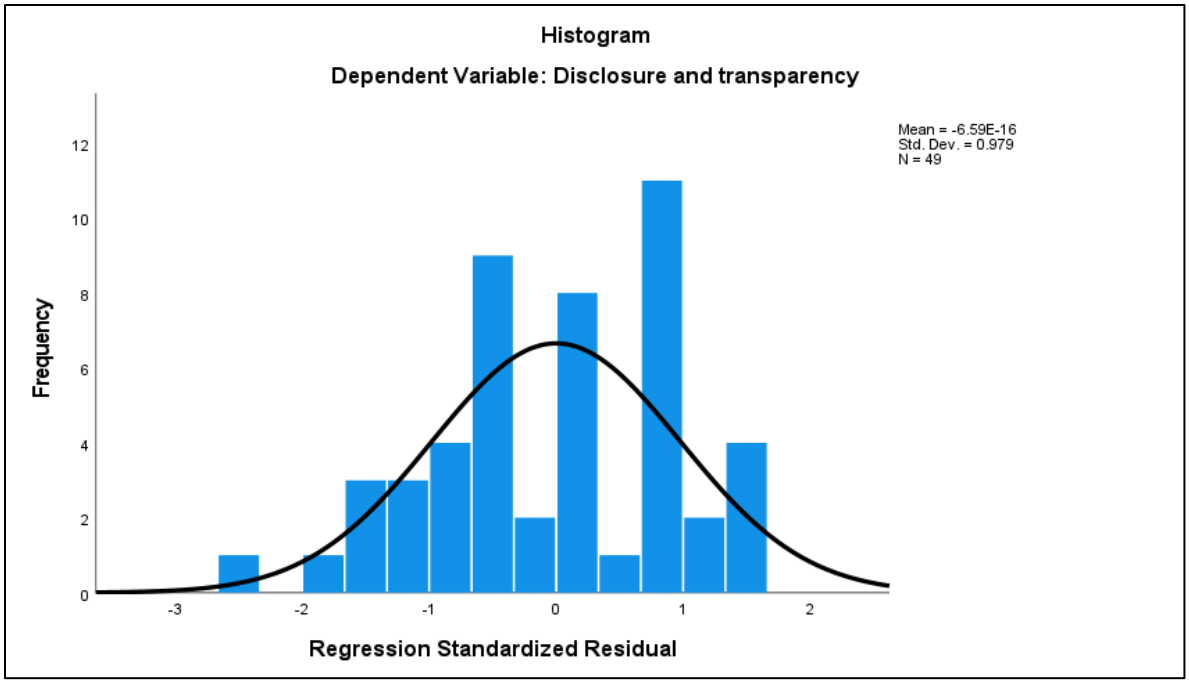
Collinearity Diagnostics[a]

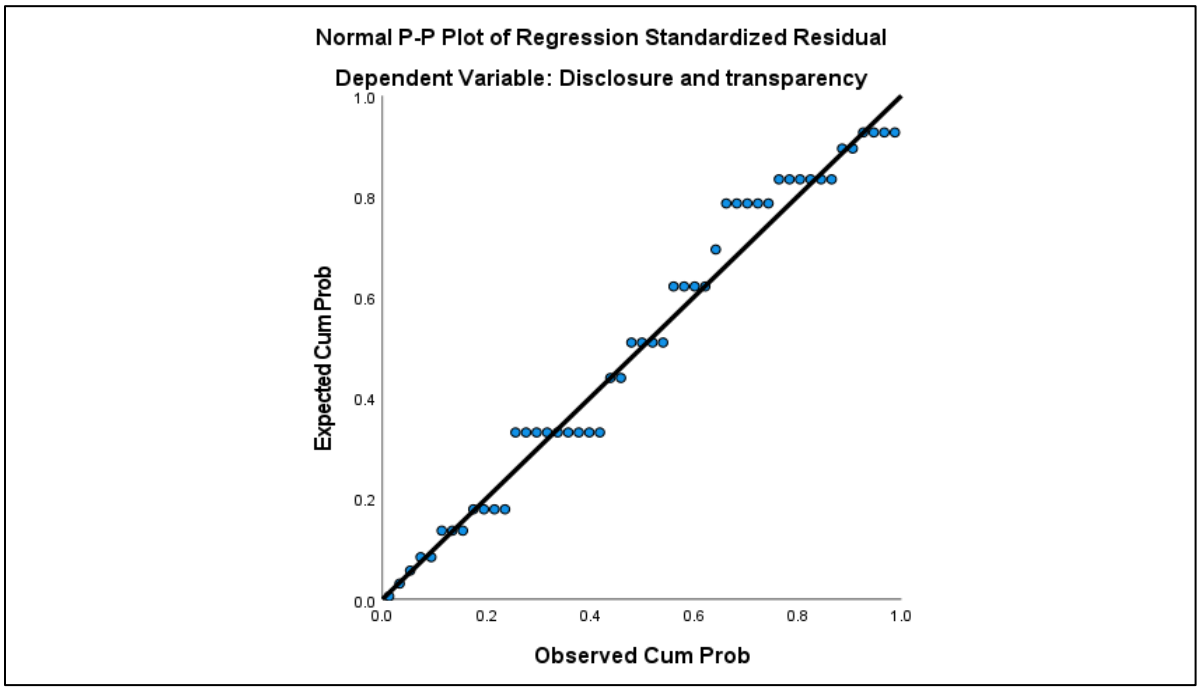
Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	Basel III	Risk culture
1	1	2,366	1,000	0,04	0,05	0,07
	2	0,452	2,288	0,02	0,27	0,75
	3	0,182	3,606	0,94	0,68	0,18
a. Dependent Variable: Disclosure and transparency						

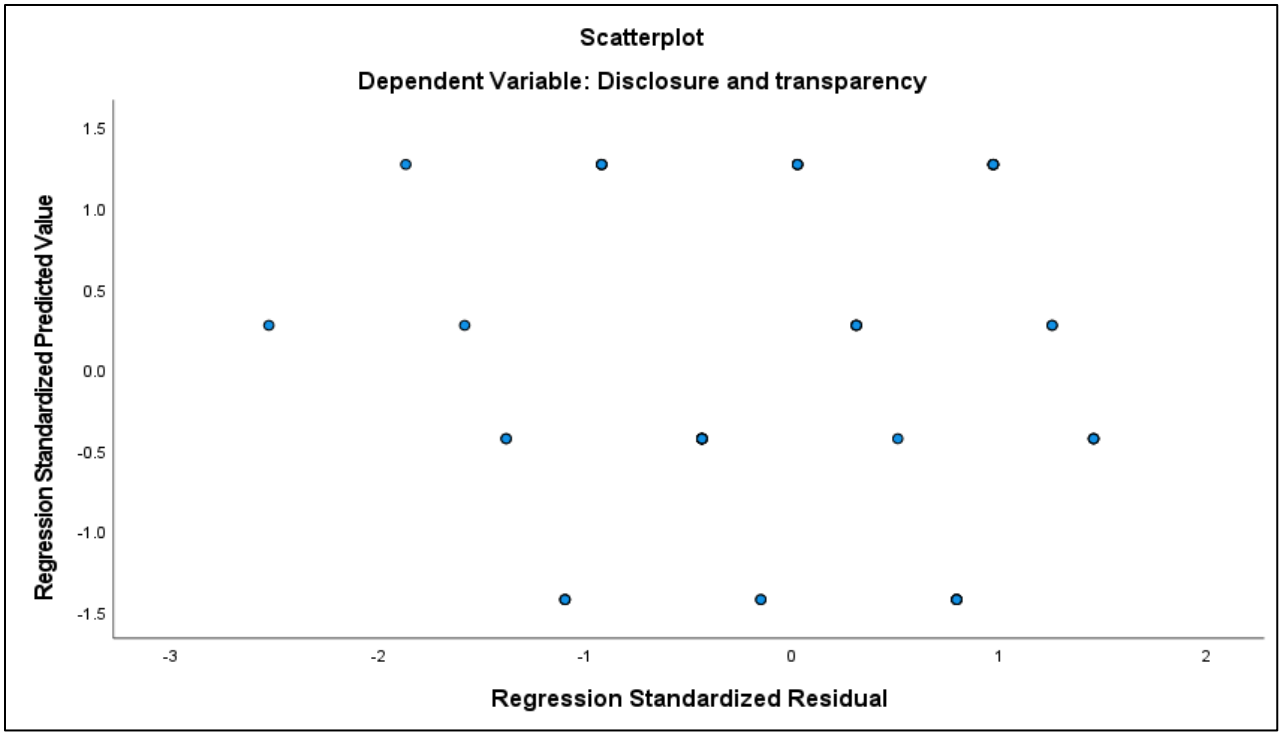
Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3,0806	3,4871	3,2959	0,15088	49

Std. Predicted Value	-1,427	1,267	0,000	1,000	49
Standard Error of Predicted Value	0,120	0,150	0,130	0,012	49
Adjusted Predicted Value	3,0482	3,5435	3,2959	0,15522	49
Residual	-1,33676	0,76912	0,00000	0,51774	49
Std. Residual	-2,528	1,454	0,000	0,979	49
Stud. Residual	-2,636	1,493	0,000	1,011	49
Deleted Residual	-1,45440	0,81085	-0,00003	0,55278	49
Stud. Deleted Residual	-2,830	1,514	-0,004	1,029	49
Mahal. Distance	1,491	2,903	1,959	0,558	49
Cook's Distance	0,000	0,204	0,023	0,032	49
Centered Leverage Value	0,031	0,060	0,041	0,012	49
a. Dependent Variable: Disclosure and transparency					


Histogram
Dependent Variable: Disclosure and transparency
Mean = -6.59E-16
Std. Dev. = 0.979
N = 49
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Disclosure and transparency
Expected Cum Prob
Observed Cum Prob


Scatterplot
Dependent Variable: Disclosure and transparency
Regression Standardized Predicted Value
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-3
-2
-1
0
1
2
Regression Standardized Residual

Appendix E – Letter from editor

H C STEYN (D Litt et Phil)
Cell: 082 551 9598
steynhc@puttyq.com

Certificate of Editing

This is to certify that I, Helena Christina Koukakis Steyn, have edited the thesis mentioned below:

Candidate:	Mr GPM Grebe
Degree:	PhD
University:	University of South Africa
Department:	Department Finance, Risk management and Banking
Title:	Operational risk management guidelines for Ghanaian banks to advance Basel III compliance.

I have edited the thesis for grammar, spelling, style, punctuation and consistency according to the Harvard Style guide provided by the Department Finance, Risk management and Banking and the New Oxford Style Manual (which includes New Hart's Rules, 2016). I have, however, adopted certain recommendations on style changes by the Department – even if these differed from the style guides mentioned above.

The document was returned with track changes for the author to accept. The content of the work edited remains that of the author.

Assoc. Prof. H C Steyn (retired)
Member of the Professional Editor's Guild
Membership: STE011 (Sept 2022-Aug 2023)

Appendix F – Letter from statistician

Liezel Korf Associates
ASSESSMENT • DEVELOPMENT • RESEARCH • STATISTICS

16 January 2023

Re: Statistical analysis: Gerhard Grebe

This serves to confirm that I, Dr. L Korf (ID 6802240144082) performed the statistical analysis for the study conducted by Mr. GPM Grebe entitled: *Operational risk management guidelines for Ghanaian banks to advance Basel III compliance*.

I confim that I am satisfied with the analyses.

Kind regards

Dr Liezel Korf

0846062666

Owner Liezel Korf
PhD, Research Psychologist & Independent Practice (Psychometry)

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